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CUMBERLAND FOSSIL PLANT (CUF) WASTEWATER TREATMENT FACILITY
FINAL ENVIRONMENTAL ASSESSMENT
Stewart County, Tennessee

Prepared by:
TENNESSEE VALLEY AUTHORITY
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Table of Contents

List of Tables

List of Figures

List of Appendices

Symbols, Acronyms, and Abbreviations

71f	Western Highland Rim
AADT	Annual Average Daily Traffic
ACS	American Community Survey
AF Blinding	Aluminum-fluoride Blinding
AICP	American Institute of Certified Planners
amsl	Above Mean Sea Level
AOC	Areas of Concern
APC	Air Pollution Control
APE	Area of Potential Effects
AS	Arsenic
BAT	Best Available Technology Economically Achievable
B.C.E.	Before the Common Era
BMPs	Best Management Practices
C	Candidate (Federal Status Code)
CAA	Clean Air Act
CCR	Coal Combustion Residuals
CCW	Condenser Cooling Water
C.E.	Common Era
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CRM	Cumberland River Mile
CUF	Cumberland Fossil Plant
CWA	Clean Water Act
dB	Decibels
dBA	A-weighted Levels
dBH	Diameter-at-breast-height
DOT	U.S. Department of Transportation
E	Endangered (State Status Code)
EA	Environmental Assessment
EIP	Environmental Investigation Plant
EIS	Environmental Impact Statement
EJ	Environmental Justice
ELG	Effluent Limitation Guidelines
END	Endangered (Status Code)
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EPSC	Erosion Prevention and Sediment Control
ESA	Endangered Species Act
FDF	Fundamentally Different Factors
FEMA	Federal Emergency Management Agency
FGD	Flue-gas Desulfurization
FHWA	Federal Highway Administration
FIS	Flood Insurance Study
FOTG	Field Office Technical Guide
FPPA	Farmland Protection Policy Act
GHGs	Greenhouse Gases
GIS	Geographic Information System
GWPS	Groundwater Protection Standards
Hg	Mercury

HUD	U.S. Department of Housing and Urban Development
IMP	Internal Monitoring Point
IPaC	Information for Planning and Consultation
IQ10	Occurs Once in 10 Years
Ldn	Day-Night Sound Level
LE	Listed Endangered (Federal Status Code)
Leq	Equivalent Continuous Sound Level
LOD	Limits of Disturbance
LT	Listed Threatened (Federal Status Code)
MCL	Maximum Containment Level
MW	Megawatt
MGD	Millions of Gallons per day
mg/L	Milligrams per Liter
msl	Mean Seal Level
N	Nitrogen
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHD	National Hydrography Dataset
No.	Number
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PAF	Paradise Fossil Plant
Pb	Lead
PE	Professional Engineer
PFIS	Preliminary Flood Insurance Study
pH	Logarithmic scale reflecting acidic or basic tendencies of a solution
PM	Particle Matter
$PM_{2.5}$	Particulate matter with particle sizes less than or equal to 2.5 micrometers
PM_{10}	Particulate matter with particle sizes less than or equal to 10 micrometers
PPD	Project Planning Document
PUBHx	Man-made Pond
PWB	Process Water Basin
RCRA	Resource Conservation and Recovery Act
RECs	Recognized Environmental Conditions
S	Species of Special Concern (State Status Code)
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Office
S-C	Species of Special Concern (State Status Code)
S1	Critically Imperiled (State Rank Code)
S2	Imperiled (State Rank Code)
S3	Vulnerable (State Rank Code)
S4	Apparently Secure (State Rank Code)
S#S#	Denotes a range of ranks because the exact rarity of the element is uncertain (State Rank Code)
Se	Selenium
SO_2	Sulfur Dioxide
SPF	Standard Project Flood

SR	State Route
SWMUs	Solid Waste Management Units
SWPPP	Stormwater Pollution Prevention Plan
T	Listed Threatened (State Status Code)
T&E	Threatened and Endangered
TCLP	Toxicity Characteristic Leaching Procedures
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
THC	Tennessee Historical Commission
THR	Threatened (Status Code)
TMSP	Tennessee Multi-Sector
TN	Tennessee
TSP	Twisted-shielded-pair
TSS	Total Suspended Solids
TST	Triad
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UPL	Upper Prediction Level
US	United States
USACE	U.S. Army Corp of Engineers
USC	United States Code
USCB	United States Census Bureau
USDA	U.S. Department of Agriculture
USFS	U.S Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compounds
WET	Whole Effluent Toxicity
WFGD	Wet Flue Gas Desulfurization
WQC	Water Quality Certification
WWT	Wastewater Treatment
WWTF	Wastewater Treatment Facility
WWTP	Wastewater Treatment Plant

Environmental Assessment CUF WWTF Summary

Cumberland Fossil Plant (CUF) is the largest generating asset in the Tennessee Valley Authority (TVA) coal fleet, generating enough energy to supply about 1.1 million homes annually. The plant consumes an average of 5.6 million tons of coal annually and produces approximately one million tons of coal combustion residuals (CCR) a year. The plant utilizes a series of environmental control devices to reduce various air emissions. One system is a wet flue gas desulfurization (WFGD) system, often referred to as a “scrubber”. The scrubber removes sulfur dioxide from flue gas by allowing it to react with limestone in a slurry. This process generates gypsum, which is discharged from the scrubber and is conveyed to an on-site gypsum dewatering facility. The dewatered gypsum is sold and used for wallboard manufacturing. Water from the gypsum dewatering process is conveyed to an existing on-site impoundment where it is treated and discharged via a National Pollutant Discharge Elimination System (NPDES) permitted outfall.

In the fall of 2015, the U.S. Environmental Protection Agency (EPA) issued revised Effluent Limitation Guidelines (ELGs) for Steam-Electric Generating Facilities. These guidelines included new, stringent discharge limits for mercury, arsenic, selenium, and nitrates/nitrites in WFGD wastewater in addition to the previous limits for total suspended solids and oil and grease. After release of the final ELGs, TVA submitted a request to EPA for approval of alternative effluent limitations based on fundamentally different factors present at CUF (see 33 U.S.C. § 1311(n)). TVA requested that CUF be subject to the mercury and arsenic limits in the 2015 ELGs, which would be met through installation of a physical-chemical wastewater treatment system. TVA further proposed optimizing and operating the physical-chemical wastewater treatment system to the extent possible to treat selenium as well and collecting data on selenium and nitrate/nitrite removal for twelve months after treatment has been optimized. Based on the performance of the system, TVA proposed that site-specific alternative technology-based percent removal limits be set for selenium and numerical limits be set for nitrate/nitrite. TVA’s request has not been acted on by EPA and remains pending. In addition, the 2015 ELGs are currently the subject of litigation and are under further review by the EPA; thus, there is uncertainty about the final revised limitations. On September 18, 2017, EPA published in the Federal Register, a postponement rule that delayed the applicability deadline of the ELGs for certain wastewaters including WFGD discharges. While the rule is being revisited, TVA is developing strategies to comply with future requirements. The proposed wastewater treatment system would be completed in stages at CUF to allow TVA to comply with any alternative effluent limitations that may be approved by EPA and/or the revised WFGD ELGs when they are released as final.

To meet the ELGs (whether amended due to TVA’s request for alternative limits or through further rulemaking) and other environmental requirements, TVA is proposing to construct wastewater treatment facilities for WFGD wastewater to remove additional solids; to reduce trace metals such as mercury, arsenic, and selenium; and to possibly reduce nitrates/nitrites from the discharges. TVA proposes to construct the WFGD treatment facility in three stages (A, B, and C) described below.

- Stage A includes installing the equipment necessary for WFGD wastewater treatment solids removal and dewatering. Stage A is expected to be completed as soon as September 2020. Gypsum fines removed during this stage will go to an on-site landfill.
- Stage B includes the physical-chemical wastewater treatment steps necessary to remove dissolved and particulate metals such as arsenic and mercury from process flows. This

stage represents the expected minimum treatment requirement resulting from EPA's approval of TVA's request for alternative limits and/or review of the ELGs.

- Stage C involves additional biological treatment of WFGD effluent to meet selenium and nitrate/nitrite limits that were outlined in the 2015 ELG rule.

Certain components could be shared between stages. For example, clarifiers may be part of both Stage A and Stage B.

Decision to be Made

This Environmental Assessment (EA) has been prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action. The primary decision TVA must make is whether to develop a new WFGD wastewater treatment system at CUF. TVA will use this EA to support the decision-making process and to determine whether an Environmental Impact Statement should be prepared or whether a Finding of No Significant Impact may be issued.

Affected Environment, Environmental Consequences, and Preferred Alternative

Some 25 resource areas were evaluated to identify potential adverse and beneficial effects of the proposed action. These resources include air and water quality, terrestrial and aquatic species including threatened and endangered species, groundwater and geology, wetlands, floodplains, prime and unique farmland, noise, socioeconomics, environmental justice, cultural resources, transportation, and health and safety.

The No Action Alternative was deemed to be an inadequate response to new water treatment regulatory requirements which require advanced technological processes to reduce or eliminate pollutants in the WFGD wastewater generated by the plant.

TVA's preferred alternative is Alternative 2 - Construct Wastewater Treatment System, Stages A & B and optimize selenium removal to the extent practical to establish site-specific selenium limits. This alternative would meet the purpose of and need for the project.

Alternative 3 would require the addition of Stage C treatment processes that may be implemented pending EPA determinations on TVA's request for alternative limits and/or the final revised ELG requirements.

The environmental effects of Alternatives 2 and 3 are similar and were found to be limited to short term or temporary construction impacts local to the facility location. Beneficial effects are anticipated to waters receiving effluent from the treatment facility, and from temporary increases in local revenue from construction jobs and a small increase in permanent employment required to operate and maintain new facilities.

CHAPTER 1 – PURPOSE OF AND NEED FOR ACTION

1.1 Background

Tennessee Valley Authority's (TVA) Cumberland Fossil Plant (CUF) is located in Cumberland City, Stewart County, Tennessee, approximately 22 miles southwest of Clarksville (Figure 1-1). The plant is on a large reservation of approximately 2,388 acres located at the confluence of Wells Creek and the south bank of the Cumberland River near Cumberland City.

Built between 1968 and 1973, CUF is a two-unit, coal-fired steam-electric generating plant with a combined generating capacity of approximately 2,600 megawatts (MW). CUF is the largest generating asset in the TVA coal fleet, generating enough energy to supply about 1.1 million homes annually. The plant consumes an average of 5.6 million tons of coal annually and produces approximately one million tons of coal combustion residuals (CCR) a year. The plant utilizes a series of environmental control devices to reduce various air emissions. One system is a wet flue gas desulfurization (WFGD) system, often referred to as a "scrubber". The scrubber removes sulfur dioxide from flue gas by allowing it to react with limestone in a slurry. This process generates gypsum, which is discharged from the scrubber and is conveyed to an on-site gypsum dewatering facility. The dewatered gypsum is sold and used for wallboard manufacturing. Water from the gypsum dewatering process is conveyed to an existing on-site impoundment where it is treated and discharged via a National Pollutant Discharge Elimination System (NPDES) permitted outfall.

In the fall of 2015, EPA issued revised Effluent Limitation Guidelines (ELGs) for Steam-Electric Generating Facilities. These guidelines included new, stringent discharge limits for mercury, arsenic, selenium, and nitrates/nitrites in WFGD wastewater in addition to the previous limits for total suspended solids, and oil and grease. Due to these changes in EPA's ELGs, TVA is evaluating the use of new wastewater treatment processes at CUF for scrubber wastewater.

After the release of the final ELGs, TVA submitted a request to EPA for approval of alternative effluent limitations based on fundamentally different factors present at CUF. The Clean Water Act allows alternative effluent limitations to be set in this way (see 33 U.S.C. § 1311(n)) when new national effluent limitations guidelines go into effect (which occurred with EPA's release of the 2015 ELGs) and the applicant can demonstrate that its facility is fundamentally different from the facilities EPA considered in the rulemaking. TVA's application set forth the basis for CUF being fundamentally different on the basis of several factors considered by EPA in the rulemaking for the 2015 ELGs (age of equipment, process employed, flows, etc.) and sought alternative effluent limitations for selenium and nitrate/nitrite.

More specifically, TVA requested that CUF be subject to the mercury and arsenic limits in the 2015 ELGs, which would be met through installation of a physical-chemical wastewater treatment system. TVA proposed to optimize and operate that physical-chemical wastewater treatment system to the extent possible to treat selenium as well. TVA would then collect data on selenium and nitrate/nitrite removal for twelve months after treatment has been optimized. Based on the performance of the system during that period, TVA proposed that site-specific alternative technology-based percent removal limits be set for selenium and numerical limits be set for nitrate/nitrite. TVA's request has not been acted on by EPA and remains pending.

In addition, the 2015 ELGs are currently the subject of litigation and are under further review by the EPA; thus, there is uncertainty about the final revised limitations. On September 18, 2017, EPA issued a postponement rule that delayed the applicability deadline of the ELGs for certain wastewaters including WFGD discharges.

While TVA's request for alternative limits is still pending and the rule is being revisited, TVA is developing strategies to comply with future requirements. The proposed wastewater treatment system would be completed in stages at CUF to allow TVA to comply with any alternative effluent limitations that may be approved by EPA and/or the revised WFGD ELGs when they are released as final, including if EPA makes not changes to the 2015 ELGs.

1.2 Description of the Proposed Action

To meet the new ELGs and other environmental requirements, TVA is proposing to construct wastewater treatment facilities for WFGD wastewater to remove additional solids; to reduce trace metals such as mercury, arsenic, and selenium; and to possibly reduce nitrates/nitrites from the discharges. TVA proposes to construct the WFGD treatment facility in three stages (A, B, and C) described below.

- Stage A includes installing the equipment necessary for WFGD wastewater treatment solids removal and dewatering. This may include clarification (single or dual stage) to remove the bulk of the solids and WFGD effluent fines dewatering to prepare for placement in a landfill. Stage A elements are required regardless of EPA's determination on TVA's request for alternative limits or possible outcomes of EPA's review of the ELG rule limits and are necessary to meet certain requirements of EPA's Coal Combustion Residuals (CCR Rule). Stage A is expected to be completed as soon as September 2020. Gypsum fines removed during this stage will go to an on-site landfill.
- Stage B includes the physical-chemical wastewater treatment steps necessary to remove dissolved and particulate metals such as arsenic and mercury from process flows. This stage formed the basis for TVA's request for alternative limits for selenium and nitrate/nitrite; it also represents the expected minimum treatment requirement resulting from EPA's review of the ELGs. This stage is expected to be implemented at CUF by September 1, 2021, to meet the mercury and arsenic limits in the ELGs. If EPA were to approve TVA's request for alternative limits for selenium and nitrate/nitrite, TVA would also attempt to optimize to the extent practical the removal of selenium from discharges using the physical-chemical treatment steps in support of development of site-specific limitations for selenium and nitrate/nitrite. In addition to the potential approval of TVA's request for alternative limits, it is also possible that the installation of only Stage A and B treatment could be appropriate as a result of EPA's reconsideration of the rule and/or other regulatory accommodation that does not require biological treatment.
- Stage C involves additional biological treatment of WFGD effluent to meet selenium and nitrate/nitrite limits that were outlined in the 2015 ELG rule.

Certain components could be shared between stages. For example, clarifiers may be part of both Stage A and Stage B. Figure 1-3 depicts a possible site design or facility layout for the structures required to process/treat wastewater. It is a concept intended to characterize what would be constructed within the area delineated in Figure 1-2.

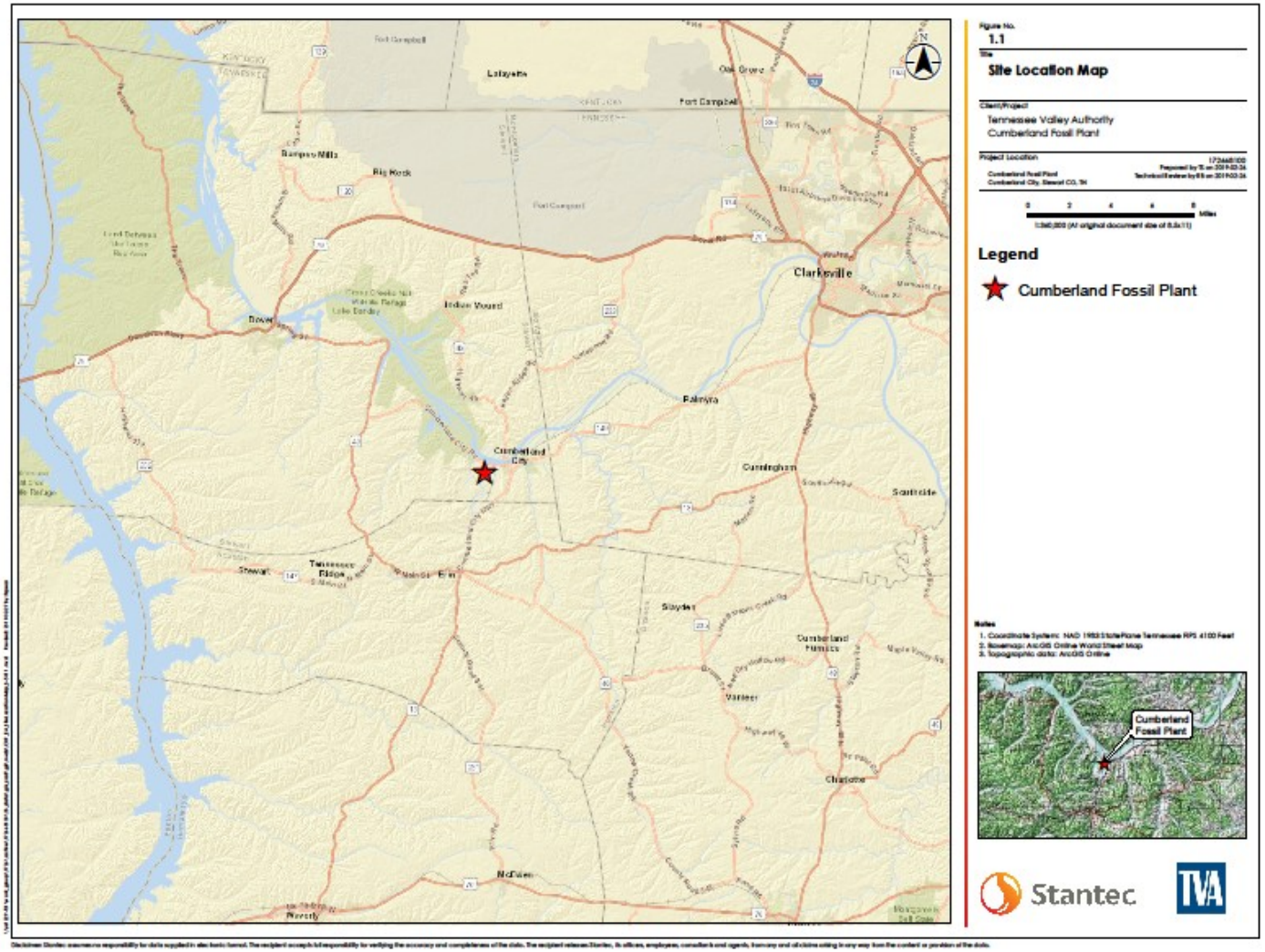

Figure 1-1. Site Location

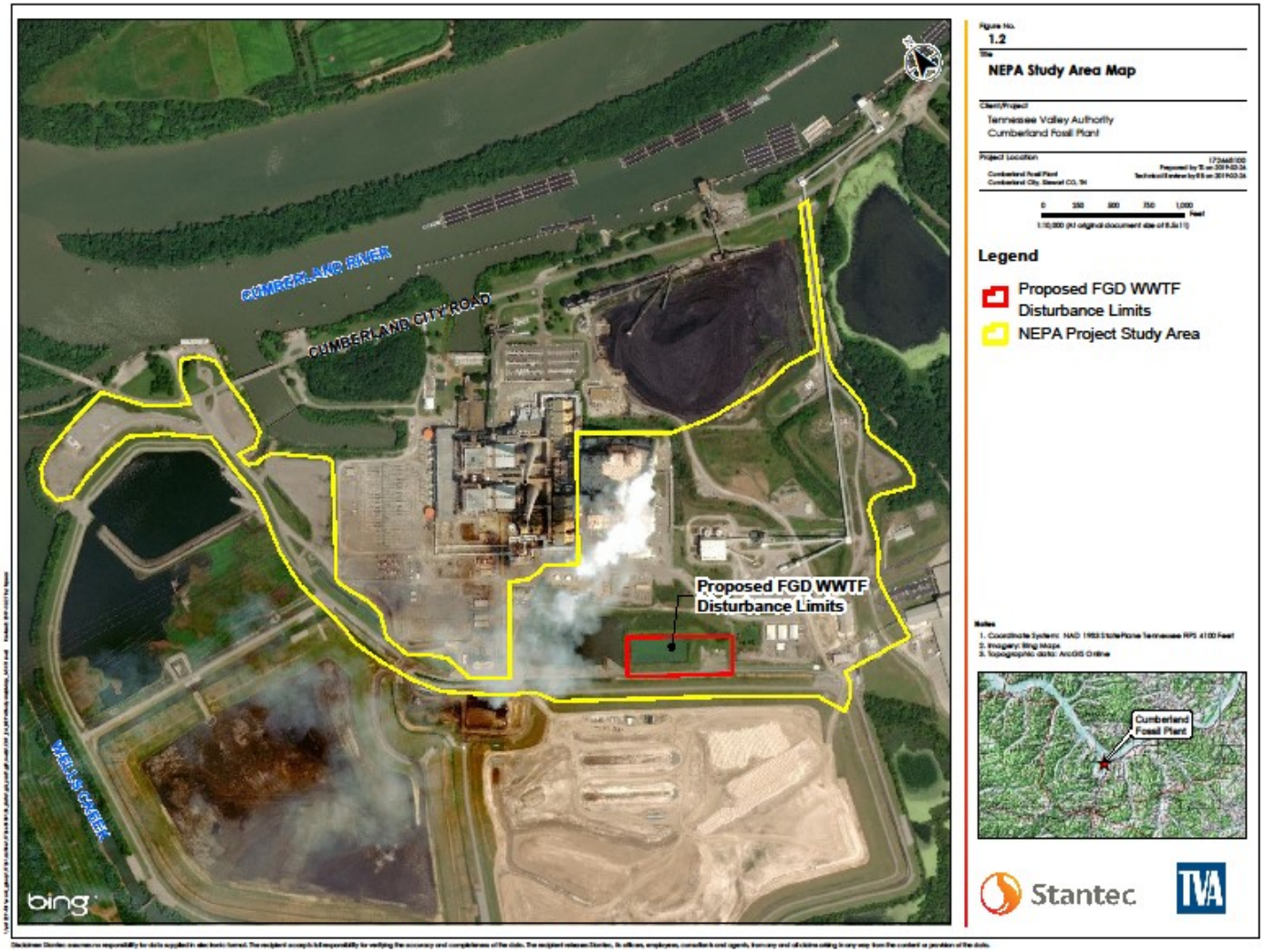

Figure 1-2. Proposed Location within CUF

1.3 Purpose and Need

The purpose for the proposed project is the construction of new WFGD wastewater treatment facilities to meet the regulatory limits that become finally applicable to the CUF facility. EPA's ELGs for Steam-Electric Generating Facilities promulgated in 2015 included new, stringent discharge limits for mercury, arsenic, selenium, and nitrates/nitrites in WFGD wastewater in addition to the previous limits for total suspended solids, and oil and grease. However, as permitted by the Clean Water Act, TVA submitted a request to EPA for alternative effluent limits for selenium and nitrate/nitrite, and that request remains pending. If the request were approved, those alternative limits would supersede the limits in the 2015 ELGs and would be the operative limits for CUF. In addition, the ELGs are currently under review by EPA and may be revised. TVA's purpose and need is to meet the final limits that are determined to be applicable to CUF on future applicability dates, either as a result of TVA's request for alternative limits or through the ELGs as finalized by EPA following its review. TVA would comply with all regulations that are finally promulgated, and applicable permits as may be issued or reissued.

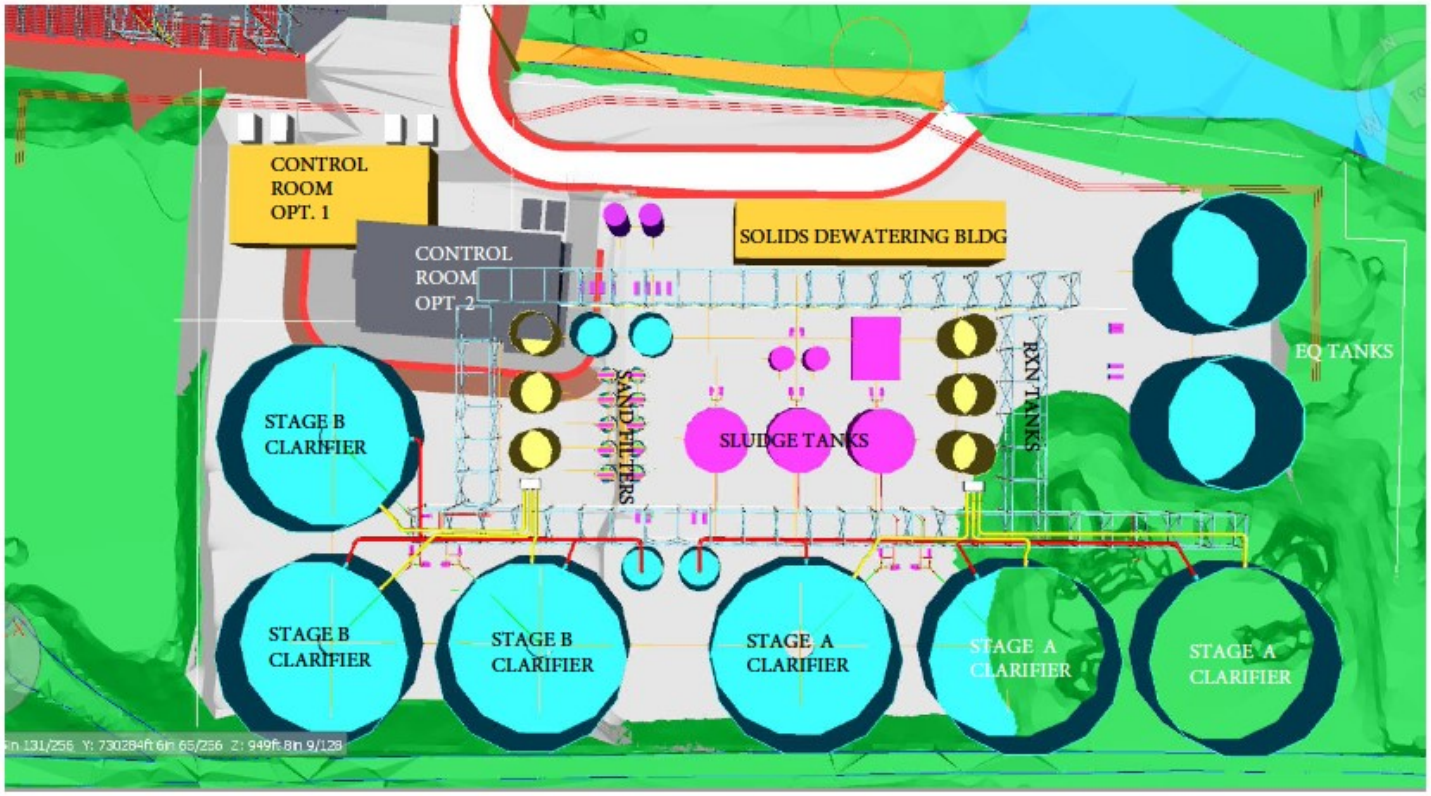

Figure 1-3. Wastewater Treatment Facility Civil Design Concept

1.4 Decision to be Made

This Environmental Assessment (EA) has been prepared to inform TVA decision makers and the public about the environmental consequences of the proposed action. The primary decision TVA must make is whether to develop new WFGD wastewater treatment system at CUF. TVA will use this EA to support the decision-making process and to determine whether an Environmental Impact Statement should be prepared or whether a Finding of No Significant Impact may be issued.

1.5 Related Environmental Reviews and Consultation Requirements

The following environmental reviews have been prepared for actions related to operations at CUF:

- Environmental Assessment Development of By-Product Disposal Facilities Cumberland Fossil Plant – Flue Gas Desulfurization Gypsum and Fly Ash (TVA 1992). This EA evaluated disposal options for gypsum and fly ash at CUF. The proposed borrow sites are needed to support partial closure of the gypsum and fly ash stacks.
- Environmental Assessment for Cumberland Fossil Plant: Sale of Property for Industrial Development (TVA 1997). This EA evaluated the sale of TVA property for development of a gypsum wallboard plant and gypsum processing plant that would utilize flue gas desulfurization scrubber gypsum from CUF. Gypsum is currently beneficially re-used at the wallboard plant.
- Integrated Resource Plan, 2015 Final Report (TVA 2015a). This plan provides direction for how TVA would meet the long-term energy needs of the Tennessee Valley region. This document and the associated Supplemental Environmental Impact Statement evaluate scenarios that could unfold over the next 20 years. It discusses ways that TVA can meet future power demand economically while supporting TVA's equally important mandates for environmental stewardship and economic development across the Tennessee Valley. The report indicated that a diverse portfolio is the best way to deliver low-cost, reliable electricity. TVA released the accompanying Final Supplemental Environmental Impact Statement for TVA's Integrated Resource Plan in July 2015 (TVA 2015b).
- Environmental Assessment for Cumberland Fossil Plant for Borrow Areas and Access Road (TVA, 2017). This EA evaluated the development of borrow sites from which TVA would get soil that would be used in the partial closure of the Dry Fly Ash and Gypsum stacks. TVA's preferred alternative for this project was Alternative B: develop and operate two borrow sites on TVA-owned property at Cumberland Fossil Plant, and construct a bridge over Wells Creek and road to provide access to the borrow site.
- Cumberland Fossil Plant Coal Combustion Residuals Management Operations Environmental Impact Statement (TVA, 2018). TVA prepared this EIS to assess the effects and address environmental, safety, and socioeconomic concerns associated with changing the management of CCR at CUF. TVA is currently still deciding between four alternative options to be used to manage CCR produced at the plant.
- Sulfur Dioxide Scrubbers Project Environmental Assessment (TVA,1994).

1.6 Scope of the Environmental Assessment

This EA evaluates the potential environmental and cultural impacts of constructing a new WFGD wastewater treatment system at CUF including necessary laydown areas to support ongoing operations to remove additional solids, reduce trace metals such as mercury, arsenic, and selenium, and to possibly reduce nitrates/nitrites from effluent discharges in order to meet ELGs currently being re-evaluated by EPA.

The laydown areas on the proposed WFGD wastewater treatment system would be on CUF property to maximize use of TVA assets and minimize transportation-related impacts to offsite areas. TVA also intends to use a previously constructed bridge on CUF property from the plant to Old Scott Road to provide additional access to the proposed wastewater treatment facility (WWTF). Previously constructed bridge areas were evaluated as part of the 2017 EA for the Cumberland Fossil Plant Borrow Areas and Access Road and their impacts are referenced in this EA.

TVA prepared this EA to comply with the National Environmental Policy Act (NEPA), regulations promulgated by the Council on Environmental Quality (CEQ) and TVA's procedures for implementing NEPA. TVA considered the possible environmental effects of the proposed action and determined that potential effects to the environmental resources listed below were relevant to the decision to be made, and assessed the potential impacts on these resources in detail in this EA.

- Air Quality
- Climate Change
- Land Use
- Prime Farmland
- Geology
- Groundwater
- Surface Water
- Floodplains
- Vegetation
- Wildlife
- Aquatic Ecology
- Threatened and Endangered Species
- Wetlands
- Transportation
- Visual Resources
- Cultural Resources
- Noise

1.7 Public and Agency Involvement

During the preparation of this EA, TVA has consulted with the following federal and state agencies:

- U.S. Fish and Wildlife Service (USFWS)
- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (EPA)
- Tennessee Department of Environment and Conservation (TDEC)
- Tennessee Wildlife Resources Agency (TWRA)
- Tennessee Historical Commission (THC)

The document was made available for public review on April 10, 2019 to May 3, 2019 and extended to May 8, 2019 to receive public comments. TVA has provided responses to those comments which are found in Appendix A.

1.8 Necessary Permits or Licenses

TVA would obtain all necessary permits, permit modifications, licenses, and approvals required for the alternative selected. TVA anticipates the following may be required for implementing the proposed alternatives.

1.8.1 General Construction Permit

A General Permit for Stormwater Discharges Associated with Construction Activities may be required for the proposed project. In addition, a Stormwater Pollution Prevention Plan (SWPPP) would be required to detail sediment and erosion control best management practices (BMPs). The current individual NPDES permit would be evaluated to ascertain if a modification would be needed as part of this project. Any necessary design approvals would be obtained from Tennessee Department of Environmental Conservation (TDEC).

1.8.2 Air Construction Permit

Air permitting regulations under the Clean Air Act (CAA) and TDEC Division of Air Pollution Control (APC) Rule Chapter 1200-03-09 would require the project to secure an air construction permit prior to the start of new facility construction.

1.8.3 Clean Water Act Section 404 Permit

Actions would be subject to federal Clean Water Act (CWA) Section 404 permit requirements for any alterations to jurisdictional streams, wetlands, and wet weather conveyance channels. A section 404 permit is not anticipated to be needed for this project.

1.8.4 Clean Water Act Section 401 Water Quality Certification

Actions would be subject to Aquatic Resource Alteration Permitting/Water Quality Certification (WQC) conditions from TDEC pursuant to Section 401(a)(1) of the CWA for proposed discharge of fill material into waters of the State of Tennessee. A Section 401 WQC is not anticipated to be needed for this project.

1.8.5 Clean Water Act Section 402 NPDES Permit

The currently effective NPDES permit for CUF includes ELG applicability dates for the limits as promulgated in the 2015 ELG Rule. The permit implements applicability dates of September 21, 2021, for mercury and arsenic limits (Stage B) and December 1, 2023, for selenium and nitrate-nitrite limits (Stage C). Because TVA's request for alternative effluent limits for selenium and nitrate/nitrite remains pending and because the reconsideration of the rule by EPA is ongoing, the final limitations and governing requirements for WFGD WWT may change. The CUF NPDES permit has a reopener clause that would provide a mechanism to address any alternative limitations that are approved and/or the possible revisions to the rule.

CHAPTER 2 - ALTERNATIVES

Descriptions of the proposed action and its alternatives, a brief comparison of their environmental effects, and TVA's preferred alternative are presented in this chapter.

2.1 Description of Alternatives

During preliminary scoping, a total of seven alternatives were initially identified. Two action alternatives were evaluated in detail in this EA along with the No Action Alternative and are described below. Five additional alternatives were considered but eliminated from further consideration. These alternatives are discussed in Section 2.2.

2.1.1 Alternative 1 – The No Action Alternative

If a wastewater treatment system is not developed and constructed at CUF, wastewater from the scrubber system would discharge into on-site Process Water Basins (PWBs), which would then discharge through the NPDES outfall. This solution is not reasonable, because the wastewater would not be properly treated to meet requirements set forth in the ELGs and incorporated in TVA's NPDES permit; however, this alternative serves as a baseline for comparison of alternatives.

2.1.2 Alternative 2 – Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, TVA would construct a new WFGD wastewater treatment system at CUF including necessary laydown areas. This alternative would maintain a once-through WFGD (scrubber) operation and implement Stages A and B previously described in Section 1.2.

2.1.3 Alternative 3 – Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, TVA would construct a new WFGD wastewater treatment system at CUF including necessary laydown areas. This alternative would maintain a once-through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C previously described in Section 1.2.

2.2 Alternatives Considered but Eliminated from Further Discussion

2.2.1 Alternative 4a – Reduce WFGD Wastewater Volume and Treat and Discharge

This alternative is based on first achieving overall reduction in volume of WFGD wastewater to be treated by conversion of the high flow, once-through WFGD scrubber at CUF to a complete recycle or partial recycle scrubber with lower flows. Recycle scrubbers return partially treated gypsum dewatering effluent to the scrubber as makeup water to achieve reduction of the volume of water to be treated in advanced wastewater treatment (WWT) processes such as physical/chemical and biological treatment. This in turn reduces the capital cost and footprint for treatment; however, upgrades to materials of construction would be needed and adverse impacts to scrubber operations could potentially occur.

Because the treatment used to reuse WFGD purges for WFGD makeup does not address all dissolved constituents, chlorides often become a limiting factor in how much WFGD purge can be returned to the WFGD scrubber. This is because elevated chlorides can cause corrosion and damage to the WFGD. CUF's WFGD were completed in the mid-1990s and were designed as once-through WFGDs that were not built with chloride resistant materials.

At the time, the once-through design was thought to achieve better sulfur dioxide (SO_2) reductions and there was ample real estate to construct an impoundment for treatment of WFGD blowdown. The design maximum chlorides concentration at CUF is approximately 3000 milligrams per liter (mg/L). In order to convert CUF WFGD to a recycle scrubber to reduce volume, significant upgrades to the materials of construction would be needed for the WFGD absorbers to withstand higher allowable concentrations of chlorides. During the preliminary phase of WFGD WWT, TVA considered lining scrubber components to withstand up to 8,000 – 12,000 mg/L chlorides but conversion to a recycle scrubber was eliminated from further evaluation for several reasons. Scrubber operation using the current once-through design has been very successful for more than 23 years and TVA is reluctant to risk air compliance impacts by changing processes that work. In addition to compliance risk, there is increased corrosion risk for recycle scrubbers that could negatively impact WFGD reliability.

Recycling effluent can also potentially increase mercury in the gypsum which could cause the wallboard marketer to reject the material. As TVA avoids significant landfill space requirements and disposal risks because of its successful gypsum marketing program at CUF, it wants to protect that marketing program.

Another risk in conversion to a recycle scrubber is that according to Electric Power Research Institute (EPRI), WFGD WWT for mercury at higher total dissolved solids may not be as effective. Testing by EPRI has confirmed that increasing dissolved constituents increases the complexity of the wastewater which reduces its ability to be treated. This appears to be because as one increases Flue-gas Desulfurization (FGD) recycle, the soluble (and/or small particulate) mercury increases and effectiveness of chemical precipitation of mercury deteriorates, making it more difficult to achieve the final ELGs for mercury.

Treatment using membrane technology and brine encapsulation would necessitate similar volume reduction and process changes and were considered as part of this evaluation and are not being pursued further.

2.2.2 Alternative 4b – Significantly Reduce WFGD Wastewater and Achieve No Discharge Standards

Another alternative considered but not pursued in detail was recycling WFGD blowdown to such an extent that chlorides in the scrubber blowdown would be increased to the 25,000 – 30,000 ppm range. The issues with this approach would be similar to those in Alternative 4a above and would also require evaporation or other discharge elimination. Evaporating the discharge incurs additional energy penalties (i.e., energy generated but consumed on site). Based on the potential risks outlined in 4a and the additional energy penalty, this alternative was therefore not analyzed in detail. This alternative was evaluated by EPA as an alternative for best available technology economically achievable (BAT) for their Steam Electric Effluent Limitations Guidelines but was not selected as BAT in that 2015 rule making. (See note above about membrane treatment and brine encapsulation as it relates to discharge elimination).

2.2.3 Alternative 4c – Employ WFGD Recycle Up to Materials of Construction Chlorides Limits to Reduce Wastewater Volume and Treat and Discharge

Another alternative considered but eliminated from further consideration would be to recycle the treated wastewater back to the WFGD only up to the chloride's limits imposed by the current materials of construction, or 3000 mg/L. Although there are times that WFGD blowdown occurs and the chlorides levels are lower, this alternative was eliminated from

further consideration because the chlorides concentrations in the WFGD absorber modules are variable. When chlorides concentrations exceed 3000 mg/L, there would be no volume reduction because the returned purge stream would already be at the limit for chlorides in the WFGD and would have to be discharged. Additionally, working with higher chlorides values due to a partial recycle could cause corrosion of components.

In addition, controlling the recycling of treated wastewater back to the WFGD based on chlorides adds complexity to the process controls. There would be six individual modules (three modules per each WFGD absorber) to control for chlorides concentration and variability between modules can be high. Ultimately the volume that could be recycled could vary such that recycle occurred only on a limited basis, not warranting the investment in the change that would be required (storage, piping, controls, etc.).

2.2.4 Alternative 5 – Convert WFGD to a Dry Scrubber

The CUF wet scrubber is very efficient and effective in reducing SO_2 emissions, provides substantial fuel flexibility that can positively affect the plant's dispatch rates, allows gypsum to be marketed for wallboard, and is not at the end of its useful life. Despite these positive attributes of Cumberland's wet scrubber, TVA nevertheless conducted a preliminary investigation of an option to convert to a dry scrubber to determine an order of magnitude expense.

The costs to retrofit CUF WFGD scrubbers to dry scrubbers are prohibitive. Depending upon the final configuration, the costs to install dry scrubbers could range from $350 to $800 million. This estimate does not reflect the costs to remove the existing wet scrubbers, which would be significant given their size and proximity to other structures at the plant. Also, this cost estimate does not reflect the significantly increased operations and maintenance (O&M) expense that would be experienced at the site. Higher O&M would be incurred due to significant loss of fuel flexibility associated with the requirements of the dry scrubber. Cumberland is otherwise currently designed to use up to 7 lb. sulfur coal, providing great fuel flexibility and the ability to adapt to changing coal markets. Dry scrubbers require a lower sulfur coal, which tends to be more expensive and limits fuel flexibility. This would prevent TVA from easily adapting to changes in fuel markets such as a price increase for a particular type of coal or from a particular supplier. In addition, the reagent used for dry scrubbers (lime) is more expensive than limestone used in WFGDs, and reagent lime production creates additional energy requirements and air emissions.

Dry scrubber product is vastly different from WFGD product in that there are no current large-scale markets for the dry product, as it contains the dry scrubber material along with fly ash collected by the dry scrubber. Converting operations either partially or completely to dry scrubbing would eliminate all or part of the source of gypsum needed by the adjacent wallboard manufacturing facility and affect the long-term economic viability of this important source of employment to the local area. This would also interfere with TVA's existing contract to market gypsum.

Due to the on-site processor (SynMat®) and adjacent wallboard plant, TVA saves millions of dollars in avoided disposal costs by providing commercial grade gypsum from its WFGD scrubber for beneficial reuse. In fact, for 2016 alone, TVA estimated avoided costs of approximately $14.6 million dollars.

In short, converting all or part of the flue gas scrubbing to dry scrubbing is not a viable option at CUF due to the capital and O&M costs and the loss of marketable gypsum with resulting increases in costs and risks associated with disposal.

2.2.5 Alternative 6 – Construct Wastewater Treatment System Using an Alternative to Biological Treatment in Stage C

TVA tested an iron-based alternative to biological treatment on a pilot scale at its Paradise Fossil Plant (PAF) and has been active in EPRI research on alternatives to biological treatment. As of this writing, there are no known full-scale biological alternative treatment systems in place, which casts the commercial viability of this technology in doubt. However, even if full-scale treatment systems were in use at another coal-fired utility, the WFGD flows at CUF are so much greater than the rest of the industry that there could be scale-up issues that are currently not known.

Another key concern is that the iron-based material is consumed in the reaction. There have not been any estimates of how much material would have to be disposed of and whether this material would be regulated as hazardous waste after use. For the test at PAF, the toxicity characteristic leaching procedures (TCLP) results came back as non-hazardous but that could vary from site to site based on variable constituents in the wastewater. It is possible that some material could be regenerated but those estimates are not available either. The possibility that the material could be put in the on-site landfill is also uncertain because it is unclear from a regulatory perspective whether the material would be allowed in the CCR landfills on site, or if it would need to be permitted separately. For the reasons listed above, iron-based alternatives to biological treatment have not been pursued further for CUF at this time.

2.2.6 Alternative Locations for WFGD WWT Equipment Considered but Eliminated from Further Consideration

Other locations for the WFGD WWT facility and/or associated equipment were considered during the evaluation of the recommended location (Site 1) (Figure 2-1). Site 1 was chosen due to its proximity to the wastewater to be treated and the ash impoundments and future PWBs to which treated flows would be routed. CUF is constrained in available real estate near or adjacent to these features. There was also a desire to keep the facilities within previously disturbed areas which eliminated the area south of the unnamed embayment. The alternative equipment locations are described below.

Site 2: Area North and West of Coal Yard Runoff Pond

This site was considered early on for WFGD wastewater treatment; however, the bottom ash dewatering project had already been sited in that area, so that location was eliminated from further consideration because there would not be sufficient room to complete the WFGD WWT project.

Site 3: Area South of Coal Storage Area.

This site was not as favorable as Site 1 as it was further away from the WFGD (the slurry being treated) and the existing ash impoundments and future PWBs where treated flow would be routed. However, siting some of the electrical equipment (i.e., transformer(s) and pad) was evaluated for a portion of this area. The area was evaluated for the transformer but was excluded from further consideration because there was a location found that is closer to the WFGD WWT footprint.

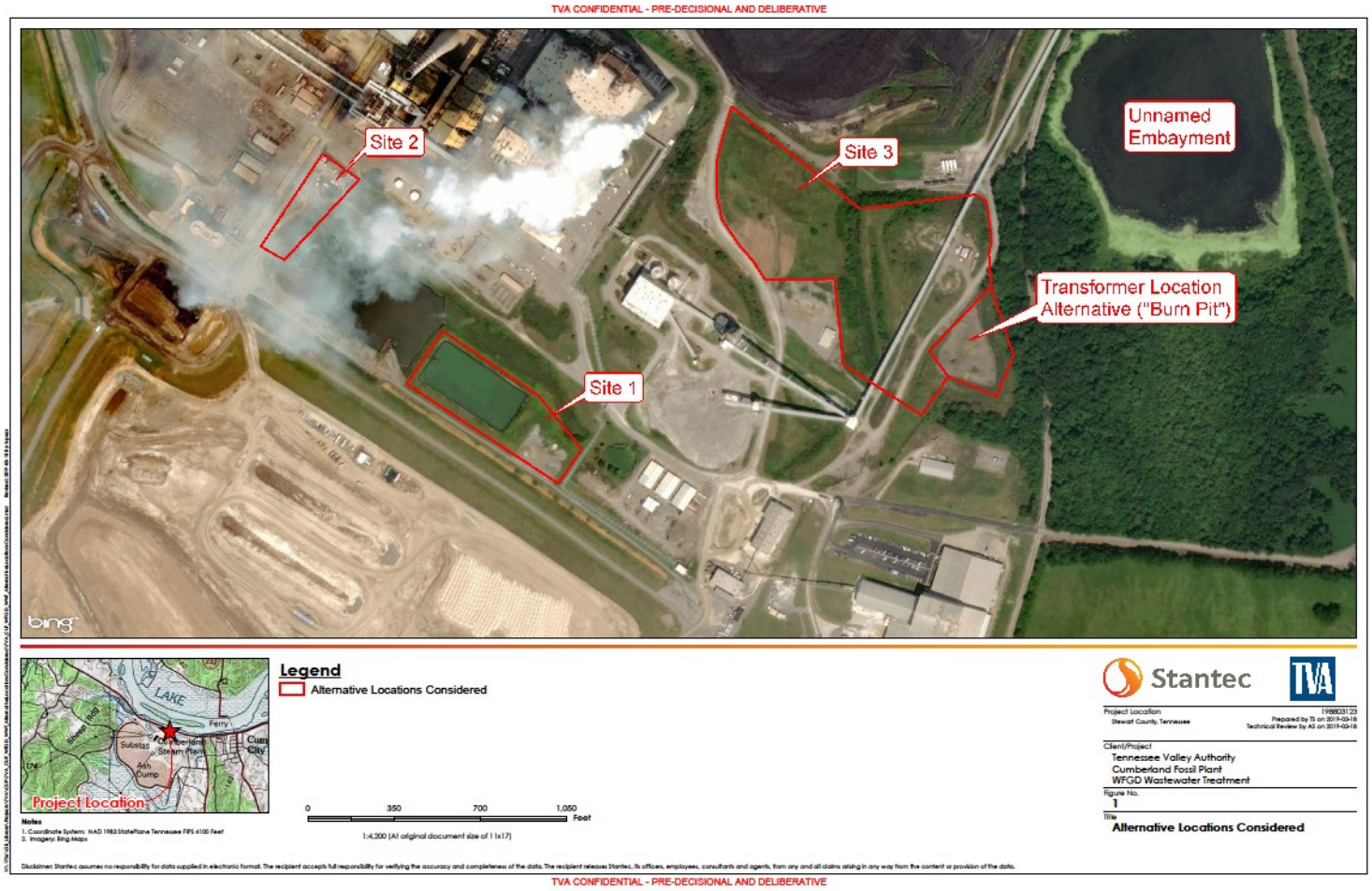

Figure 2-1. Map of Alternative Locations Considered

2.3 Comparison of Alternatives

The environmental impacts of each of the alternatives under consideration are summarized in Table 2-1. These summaries are derived from the information and analyses provided in Chapter 3 - Affected Environment and Chapter 4 - Environmental Consequences sections of each resource.

Table 2-1. Summary and Comparisons of Alternatives by Resource Area

Resource Area	Impacts		
	Alternative 1 – No Action	**Alternative 2 – Construct Wastewater Treatment System Stages A & B**	**Alternative 3 – Construct Wastewater Treatment System Stages A, B, & C**
Air quality	No impact	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during development of the WWTF and transport of construction materials on public roadways.	Temporary minor impacts from fugitive dust and emissions from equipment and vehicles during development of the WWTF and transport of construction materials on public roadways.
Climate Change and Greenhouse Gasses	No impact	Transport of construction materials contributes to localized CO_2 emissions. Long-term minor, impact from air emissions from operation of the WWTF.	Transport of construction materials contributes to localized CO_2 emissions. Long-term minor, impact of air emissions from operation of the WWTF.
Vegetation	No impact	Minor impact to mostly non-native species. Very little native vegetation exists within the project study area.	Minor impact to mostly non-native species. Very little native vegetation exists within the project study area.
Terrestrial Ecology	No impact	Minor impacts would result to terrestrial wildlife since project study areas have been previously disturbed and little native vegetation exists within the project study area.	Minor impacts would result to terrestrial wildlife since project study areas have been previously disturbed and little native vegetation exists within the project study area.
Aquatic Ecology	Current water quality would not change.	Slightly improved water quality and benefit to aquatic resources	Slightly improved water quality and benefit to aquatic resources
Threatened and Endangered Species	No impact	No impact	No impact
Surface Water / Water Quality	Water Quality of CUF effluent would likely not meet new ELG standards	Water quality is expected to remain the same as no action or slightly improve	Water quality is expected to remain the same as no action or slightly improve
Groundwater	No impact	No impact	No impact
Geology and Soils	No impact	Minor temporary increase in soil erosion during the WWTF construction and soil excavation activities. Soil erosion will be minimized with BMPs proper erosion prevention/sediment control measures.	Minor temporary increase in soil erosion during the WWTF construction and soil excavation activities. Soil erosion will be minimized with BMPs proper erosion prevention/sediment control measures.
Wetlands	Current water quality from CUF effluent discharged into downstream waters	No jurisdictional wetlands under Sections 401 and 404 of CWA on-site; no on-site impacts. Downstream, offsite	No jurisdictional wetlands under Sections 401 and 404 of CWA on-site; no on-site impacts. Downstream, offsite wetlands may have

Table 2-1. Summary and Comparisons of Alternatives by Resource Area

Resource Area	Impacts		
	Alternative 1 – No Action	**Alternative 2 – Construct Wastewater Treatment System Stages A & B**	**Alternative 3 – Construct Wastewater Treatment System Stages A, B, & C**
	may have a minor impact on riparian wetlands during flooding events. (Same as current.)	wetlands may have reduced impacts from pollutants during flooding events.	reduced impacts from pollutants during flooding events.
Floodplains	No impact	Minor and temporary encroachment on floodplain	Minor and temporary encroachment on floodplain
Natural Areas & Parks and Recreation	No impact	No impact	No impact
Cultural Resources	No impact	No impact	No impact
Solid Waste and Hazardous Waste	No impact	No impact	No impact
Land Use	No impact	Impact is minor because the land, previously disturbed, is located on CUF property which supports industrial use and because there is an abundance of undeveloped land nearby.	Impact is minor because the land, previously disturbed, is located on CUF property which supports industrial use and because there is an abundance of undeveloped land nearby.
Prime Farmland	No impact	No impact. Although some soils located within the project study area were identified as “Prime Farmland” soils by the USDA NRCS mapper, soils have been in industrial use for decades.	No impact. Although some soils located within the project study area were identified as “Prime Farmland” soils by the USDA NRCS mapper, soils have been in industrial use for decades.
Roadway Transportation	No impact	Minor temporary impact during construction on use of public roadways.	Minor temporary impact during construction on use of public roadways.
Visual Resources	No impact	No impact	No impact
Noise	No impact	Minor impact to noise receptors along the access route due to noise emissions from trucks transporting construction materials to CUF. The increase in noise would be intermittent (occurring only during specified construction periods) and would occur only during normal working hours.	Minor impact to noise receptors along the access route due to noise emissions from trucks transporting construction materials to CUF. The increase in noise would be intermittent (occurring only during specified construction periods) and would occur only during normal working hours.

Table 2-1. Summary and Comparisons of Alternatives by Resource Area

Resource Area	Impacts		
	Alternative 1 – No Action	**Alternative 2 – Construct Wastewater Treatment System Stages A & B**	**Alternative 3 – Construct Wastewater Treatment System Stages A, B, & C**
Socioeconomics and Environmental Justice	No impact	Temporary construction related employment and local service revenue. Minor increase in permanent employment is anticipated.	Temporary construction related employment and minor increase in permanent employment are anticipated.
Health and Safety	No impact	No impact	No impact
Cumulative Impacts	No notable cumulative effects.	No cumulative impacts are anticipated.	No cumulative impacts are anticipated.

2.4 Identification of Mitigation Measures

The following mitigation measures and best management practices (BMPs) have been identified to reduce potential environmental effects:

- Best practices and limitations prescribed in the Stormwater and Air Permit for Construction Activities (for Alternatives 2 and 3)
- Erosion controls and BMPs for stormwater impacts (for Alternatives 2 and 3)
- Dust control during construction (for Alternatives 2 and 3)
- Covering of byproduct during transport and the use of dust control measures during WWTF operation (for Alternatives 2 and 3)
- Use of wastewater treatment additives, as needed, to help with pH control, the settling of solids, and the reduction of metals during dewatering operations (for Alternatives 2 and 3)

2.5 The Preferred Alternative

TVA's preferred alternative is Alternative 2 – Construct Wastewater Treatment System, Stages A & B and optimize selenium removal to the extent practical to establish site-specific selenium and nitrate/nitrite limits. This alternative would meet the purpose and need of the project. TVA acknowledges that Alternative 2 would not likely enable TVA to meet the limits on selenium and nitrate/nitrate currently set in the NPDES permit issued for CUF, which incorporates the limits promulgated in the 2015 ELG Rule. However, as noted above, TVA's application for alternative limits based on fundamentally different factors is still pending; additionally, EPA is reconsidering the 2015 rule. To the extent that EPA's decision on TVA's fundamentally different factors application and/or the reconsidered rule require more treatment than is contemplated under Alternative 2, TVA would reconsider its preferred alternative to enable compliance with the requirements. In addition, the treatment steps in Alternative 2 are necessary precursors for biological treatment to meet the existing selenium and nitrate-nitrite ELGs, should that ultimately be required at CUF.

CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter includes descriptions of the affected environment and documents the existing conditions of the project area. These descriptions serve as a baseline for understanding the resources that could be impacted by the implementation of the alternatives described in Chapter 2. It also describes the affected environment (existing conditions) of environmental resources in the project area. The affected environment descriptions below are based on surveys conducted in 2014, published and unpublished reports, historical data, and personal communications with resource experts. This serves as the baseline conditions against which the TVA decision maker and the public can compare the potential effects of the alternatives under consideration.

3.1 Air Quality

Through passage of the Clean Air Act (CAA), Congress mandated the protection and enhancement of our nation's air quality resources. National Ambient Air Quality Standards (NAAQS) for the following criteria pollutants have been set to protect public health and welfare:

- Sulfur dioxide (SO_2)
- Ozone
- Nitrogen (N) dioxide (NO_2)
- Particulate matter with particle sizes less than or equal to 10 micrometers (PM10)
- Particulate matter with particle sizes less than or equal to 2.5 micrometers (PM2.5)
- Carbon monoxide (CO)
- Lead (Pb)

The primary NAAQS were promulgated to protect public health, and the secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air (EPA 2017a).

In accordance with the CAA Amendments of 1990, all counties are designated with respect to compliance, or degree of noncompliance, with the NAAQS. These designations are either attainment, nonattainment, or unclassifiable. An area with air quality better than the NAAQS is designated as "attainment"; whereas an area with air quality worse than the NAAQS is designated as "non-attainment". Non-attainment areas are further classified as extreme, severe, serious, moderate, or marginal. An area may be designated as unclassifiable when there is a lack of data to form a basis of attainment status.

Stewart County and the surrounding counties (Benton, Christian, Calloway, Henry, Houston, Montgomery, Trigg) are all in attainment with applicable NAAQS (EPA 2017) and Tennessee ambient air quality standards referenced in the Tennessee Air Pollution Control Regulations Chapter 1200-3-3.

Proposed construction activities would be subject to both federal and state (Tennessee Division of Air Pollution Control) regulations. These regulations impose permitting requirements and specific standards for expected air emissions.

3.2 Climate Change

"Climate change" refers to any substantive change in measures of climate, such as temperature, precipitation, or wind lasting for an extended period (decades or longer) (EPA 2016). The 2014 National Climate Assessment concluded that global climate is projected to continue to change over this century and beyond. The amount of warming projected beyond the next few decades, by these studies, is directly linked to the cumulative global emissions of greenhouse gases (GHGs) (e.g., Carbon Dioxide [CO_2], methane). By the end of this century, the 2014 National Climate Assessment concluded a 3°F to 5°F (1.7°C to 2.8°C) rise can be projected under the lower emissions scenario and a 5°F to 10°F (2.8°C to 5.6°C) rise for a higher emissions scenario (Melillo et al. 2014).

Climate change is primarily a function of too much CO_2 in the atmosphere. CO_2 is the primary GHG emitted through human activities. Activities associated with the proposed action that produce CO_2 are primarily related to emissions from fossil-fuel-powered equipment (e.g., bulldozers, loaders, haulers, trucks, generators, etc.) during construction and transport of borrow material.

3.3 Terrestrial Ecology

3.3.1 Vegetation

A site visit was conducted at CUF on December 20, 2018 to review and document the botanical features within the project study area. CUF steam plant site has been heavily disturbed by construction of the facility and decades of maintenance and operation. As such, very little to no natural vegetative communities exist within CUF WFGD project study area. The majority of the WFGD project study area consists of unvegetated areas covered by gravel, asphalt, concrete, buildings, or crushed coal. Of the remaining vegetated areas, most consist of mowed and bush-hogged areas populated primarily by non-native and invasive plant species. Isolated areas of saplings and scrub-shrub are also present in small areas where maintenance is less frequent. Finally, areas around stormwater ditches and catchment basins are almost exclusively covered by common reed (*Phragmites australis*). Table 3-1 presents the major vegetative communities on-site along with their acreage and dominant species:

Table 3-1. Vegetative Communities within the Project Study Area

Type*	Dominant Species	Area (acres)	Percent of Study Area
Sorghum halepense-Schedonorus arundinaceus Herbaceous Vegetation	*Sorghum halepense, Schedonorus arundinaceus, Trifolium repens, Rubus argutus, Solidago canadensis, Symphyotrichum pilosum*	49.0	34.5%
Ulmus americana/ Ligustrum sinense Shrubland	*Ulmus americana, Acer negundo, Ligustrum sinense, Rubus argutus, Coronilla varia*	3.4	2.4%
Phragmites australis Herbaceous Vegetation	*Phragmites australis*	5.5	3.9%
Open Water	None	7.4	5.2%
Improvements (Industrial)	None	76.7	54.0%
Total		142.1	100.0%

*Based on classification system outlined in *International Classification of Ecological Communities: Terrestrial Vegetation of the United States* (Grossman et al. 1998).

3.3.2 Wildlife

On December 20, 2018, Stantec Biologists conducted an on-site review of the project study area to assess potential impacts of the proposed action to terrestrial wildlife.

The project study area has been heavily disturbed by construction, maintenance, and ongoing operations of CUF facility. Areas around the existing facility are regularly mowed and maintained turf grasses. Although very small areas of saplings less than three inches diameter-at-breast-height (DBH) can be found on-site, no mature forested habitats exist within the action boundary. Habitats within the action area include *Sorghum halepense-Schedonorus arundinaceus* herbaceous vegetation, *Ulmus americana/ Ligustrum sinense* shrubland, *Phragmites australis* herbaceous vegetation, open water, and improved (industrial) areas. The action area provides marginal habitat for generalist species such as white-tailed deer (*Odocoileus virginianus*), racoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), Eastern gray squirrel (*Sciurus carolinensis*), beaver (*Castor canadensis*), American crow (*Corvus brachyrhynchos***)**, Northern mockingbird (*Mimus polyglottos*), song sparrow (*Melospiza melodia*), Northern cardinal (*Cardinalis cardinalis*), American robin (*Turdus migratorius*), killdeer (*Charadrius vociferous*), black rat snake (*Pantherophis obsoletus*) and American toad (*Anaxyrus americanus*).

3.3.3 Migratory Birds

The US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) report has identified six migratory bird species of conservation concern that may occur in the action area, but no species currently listed under the Endangered Species Act (ESA). These are blue-winged warbler (*Vermivora cyanoptera*), Kentucky warbler (*Geothlypis formosa*), prairie warbler (*Setophaga discolor*), red-headed woodpecker (*Melanerpes erythrocephalus*), wood thrush (*Hylocichla mustelina*) and bald eagle (*Haliaeetus leucocephalus*). The blue-winged warbler is found in second growth woodlands and brushy overgrown fields and thickets. The Kentucky warbler is found in rich moist hardwood woodlands. The prairie warbler is found in open woods, overgrown fields and shrublands. The red-headed woodpecker resides in open deciduous woodlands nesting in excavated or natural cavities in trees, snags, and some artificial structures such as fence posts and poles. The wood thrush is found in hardwood and mixed pine/hardwood forests. Although migrating birds may pass through CUF during migration, no suitable breeding habitat occurs in the action area for the blue-winged warbler, Kentucky warbler, prairie warbler, red-headed woodpecker, and wood thrush. Other migratory bird species not listed in the IPaC report could potentially use the action area for breeding and foraging including the song sparrow, American crow, and red-winged blackbird (*Agelaius phoeniceus*).

Other information was found during the course of the review as listed below:

- Although it has been de-listed under the ESA, the bald eagle is addressed in the Threatened and Endangered Species Section below.
- A cliff swallow (*Petrochelidon pyrrhonota*) colony is known to occupy a bridge near the northeast portion of the action site (Elizabeth Hamrick TVA pers. com.).
- A review of the TVA Regional Natural heritage database in December 2018 indicates that no heronries are reported within three miles of the action area.

3.4 Aquatic Ecology

TVA personnel conducted a desktop review of the project study area using aerial imagery and USGS topographic maps. Personnel did not document any jurisdictional water features within the project study area. There are several channels within the project study area consisting of permitted stormwater, cooling water, and other process discharges. These channels and conveyances are either covered under the site NPDES or Tennessee Multi-Sector permits for stormwater associated with industrial activity (TMSP) permits and are thus covered under Section 402 of the Clean Water Act.

For further information on site surface water features, see the 3.6 Surface Water and Wastewater section of this document.

3.5 Threatened and Endangered Species

The ESA (16 United States Code [USC] §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. Likewise, a threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Section 7 of the ESA requires federal agencies to consult with the USFWS when their proposed actions may affect endangered or threatened species and their critical habitats.

The State of Tennessee provides protection for species considered threatened, endangered, or deemed in need of management within the state other than those already federally listed under the ESA. Plant species are protected in Tennessee through the Rare Plant Protection and Conservation Act of 1985. The listing of species is managed by TDEC. Additionally, TVA also maintains databases of aquatic and terrestrial animal species that are considered threatened, endangered, special concern, or are otherwise tracked in Tennessee because the species is rare and/or vulnerable within the state.

3.5.1 Vegetation

A December 2018 query of the TVA Heritage Database indicates a single plant species of concern within a five-mile radius of the project study area and a single federally-listed species from within the county. The USFWS IPaC website also identifies the same federally-listed plant of concern.

Table 3-2. Plant Species of Conservation Concern for the Project Study Area

Common Name	Scientific Name	Federal Status	TN State Status (Rank)
Swamp Lousewort[1]	*Pedicularis lanceolata*	-	SPCO (S1S2)
Price's Potato Bean[2]	*Apios priceana*	LT	E (S3)

Federal Status Codes: LE = Listed Endangered; LT = Listed Threatened; C = Candidate
State Status Codes: E = Listed Endangered; T = Listed Threatened; SPCO = Species of Special Concern; S-C = Species of Special Concern – Commercially Exploited
State Rank codes: S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

[1] Identified within 5 miles through TVA Heritage Database; [2] Identified through USFWS IPaC website; [3] Identified through TDEC Rare Species by County, Stewart County list

Heavy disturbance and generally degraded habitats on-site are unlikely to support the type of specialized, higher quality habitats required by these plant species.

Habitat for swamp lousewort is variously described as “wet, acidic barrens and seeps” (TDEC County List 2018) or “wet meadows and marshes” (Tennessee Flora Committee 2014). The best available wetland-like features within the project study area consist of stormwater ditches and catchment basins dominated by common reed (Phragmites) to the exclusion of almost all other species. Continuous siltation and soil disturbance and the lack of high-quality wetlands on-site precludes the potential for swamp lousewort within CUF WFGD project area.

The only federally-listed plant of concern for the project study area is Price’s potato bean. This species generally inhabits openings in forests and forest edges, often in riparian areas. The repeated soil disturbance over several decades and the lack of any forested habitats within the project study area also precludes the potential for Price’s potato bean within CUF WFGD project area.

3.5.2 Terrestrial Wildlife

The USFWS IPaC report lists three federally listed species that have the potential to occur near the action area and have been recorded from Stewart County, Tennessee: the Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*) and northern long-eared bat (*Myotis septentrionalis*). Additionally, the TVA Regional Natural Heritage database includes the hellbender (*Cryptobranchus alleganiensis*). Although it has been de-listed under the ESA, the bald eagle is also addressed below.

A survey for endangered bats was conducted in 2011 for a proposed dry ash landfill near CUF (ESI 2011). The survey was conducted within 1.5 miles of the proposed WWTF action. A northern long-eared bat was captured approximately 1.9 miles from the action area. No gray bats or Indiana bats were captured during the 2011 survey (ESI 2011). A northern long-eared bat hibernacula occurs approximately three miles from the action area. Hibernacula for Indiana bat and gray bat are known approximately eight miles away in Montgomery County, Tennessee.

The Indiana bat winters in caves and abandoned mines. Summer roosting habitat includes forests and woodlots containing potential roost trees, which have exfoliating bark, cracks, or crevices in trees (alive or dying) or snags that are greater than five inches DBH. Foraging habitat consists of forested patches, wooded riparian corridors, and natural vegetation adjacent to these areas. Commuting habitat includes wooded tracts, tree-lines, wooded hedgerows, streams, or other such pathways that are within or connected to roosting or foraging areas. No suitable roosting habitat for the Indiana bat is present in the action area due to the lack of suitable roost trees over five inches DBH. No caves or cave-like features that could serve as winter hibernacula habitat have been identified on-site. Suitable foraging habitat for the Indiana bat may occur within and adjacent to the action area over surface waters and ash impoundments.

The gray bat uses different caves for summer roosting and winter hibernating. Summer caves are usually within one half mile of a river or reservoir, which provides foraging habitat. During the summer, females give birth and rear the young in maternity caves, while males and yearlings roost in separate bachelor caves. Caves preferred for hibernation are typically deep vertical caves. No suitable roosting for the gray bat is present in the action area due to

lack of caves. Foraging habitat for the gray bat may occur within and adjacent to the action area over surface waters, ash impoundments and over the Cumberland River.

The northern long-eared bat winters in caves and mines. During the summer, they roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (typically greater than three inches DBH). Males and non-reproductive females may also roost in cooler places like caves and mines. This bat has also rarely been found roosting in structures such as barns and sheds. Foraging occurs on forested hillsides and ridges and occasionally over forest clearings, over water and along tree-lined corridors. A well-traveled bridge exists immediately adjacent to the action area, but no bats are known to roost here, and no actions would occur to this bridge. No suitable roosting for the northern long-eared bat is present in the action area due to the lack of suitable roost trees greater than three inches DBH. No caves or cave-like structures suitable for winter hibernacula habitat are known within the action area. Foraging habitat for the northern long-eared bat may occur within and adjacent to the action area over surface waters and ash impoundments. No forested foraging habitat occurs in the action area.

The hellbender is found in rocky, clear creeks and rivers. A review of the TVA Regional Natural heritage database indicates an historic record of the hellbender in Stewart County and no current occurrences are known within three miles of the action area. No suitable habitat for the hellbender occurs in the action area.

Table 3-3. Federally and State Listed Terrestrial Animal Species of Known within Three Miles of the Action Study Area or within Stewart County, Tennessee[1]

Common Name	Scientific Name	Federal Status[2]	TN State Status[3] (Rank[4])
AMPHIBIANS			
Hellbender	*Cryptobranchus alleganiensis*	PS	E(S3)
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	-	D(S3)
MAMMALS			
Gray bat	*Myotis grisescens*	LE	E(S2)
Indiana bat	*Myotis sodalis*	LE	E(S1)
Northern long-eared bat	*Myotis septentrionalis*	LT	T(S1S2)

[1]Sources: TVA 2019 and USFWS IPaC
[2]Federal Status Codes: LE = Listed Endangered; LT = Listed Threatened; C = Candidate; PS - Partial Status = Not listed by USFWS
[3] State Status Codes: E = Listed Endangered; T = Listed Threatened; S = Species of Special Concern; S-C = Species of Special Concern - Commercially Exploited; D = Deemed in need of management
[4]S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2); Migratory species may have separate ranks for different population segments (e.g., S1B, S2N, S4M); S#B = rank of breeding population; S#N = rank of nonbreeding population.

The bald eagle occurs along coasts, rivers, and large lakes, where bodies of water provide primary food sources and where suitable trees for nesting occur nearby. The TVA Regional Natural Heritage database query identifies one bald eagle nest occurrence within 1000 feet of the action boundary. The nest was not definitively located during the December 20, 2018 site visit due to poor visibility conditions, and no eagles were documented visiting the area during a half-hour of observation.

A second site visit to monitor for bald eagle activity was conducted on May 13, 2019 by a qualified wildlife biologist who is formally educated in the wildlife biological sciences and well experienced in recognizing specific patterns of eagle behavior. Monitoring for bald eagle activity was conducted from a location along the small reservoir shoreline and on Old CC Road located in the southwestern most portion of the Project Study Area. The monitoring location was selected based on it being an ideal distance (approximately 1,100 ft) and providing clear vantage point from the known location of the Bald eagle nest as well as ideal feeding locations. Monitoring was conducted using both binoculars and a high-powered spotting scope for approximately six and one-half hours between 11:00 AM and 5:30 PM. During this period no bald eagle sighting were observed.

The Cumberland River adjacent to CUF provides suitable foraging habitat; however, no suitable foraging or nesting habitat for the bald eagle occurs in the action area. No activities that would disturb the bald eagle during breeding season (e.g., timber removal, blasting) would occur in the action area. Additionally, the USFWS recommends a 660 feet buffer for construction activities visible from the nest (USFWS 2007).

3.5.3 Aquatic Species

A query of the TVA Natural Heritage Database (January 18, 2019) documented one federally protected mussel (pink mucket) and two state-listed fish (blue sucker and lake sturgeon) known to occur within Stewart County, Tennessee. The federally protected pink mucket was historically documented within the Tennessee River (Kentucky Lake) and is not believed to occur adjacent or immediately downstream from CUF plant.

Table 3-4. Aquatic Threatened & Endangered Federally and State Listed 1 Aquatic Species known from Stewart County, Tennessee

Common Name	Scientific Name	State Status[1] (Rank)[2]	Federal Status
Fish			
Blue Sucker	*Cycleptus elongatus*	THR (S2)	-
Lake Sturgeon	*Acipenser fulvescens*	END (S1)	-
Mollusks			
Pink Mucket	*Lampsilis abrupta*	END (S2)	END

[1]Status Codes: END = Endangered; THR = Threatened
[2]State Ranks: S1 = Critically Imperiled; S2 = Imperiled

3.6 Surface Water and Wastewater

3.6.1 Surface Water – Lower Cumberland River, Barkley Reservoir

CUF is located in northern middle Tennessee, southwest of Clarksville on the south shore of Barkley Reservoir (Cumberland River), approximately 72 miles upstream of Barkley Dam. CUF is drained by permitted storm water outfalls, wet weather conveyances, the Condenser Cooling Water (CCW) discharge (Outfall 002), and process and storm water discharges from

the Main Ash Impoundment at internal monitoring point (IMP) 001. The CCW, Outfall 002, discharges to the Cumberland River at CRM 102.8. The plant intake is located approximately at Cumberland River Mile (CRM) 103.2 and intakes water for cooling and process purposes. (TDEC 2018, July).

The Lake Barkley Watershed (USGS HUC 05130205) is approximately 2,343 square miles with approximately 982 square miles in Tennessee and includes parts of six counties in Tennessee. A part of the Cumberland River drainage basin, the watershed has 1,258 stream miles and includes 27,000 acres in Tennessee. The land use in the watershed is primarily deciduous forest (68 percent) and agricultural (22 percent with 13 percent in pasture/hay, 5 percent in grassland/herbaceous and 4 percent in row crops). The remainder is low intensity residential comprising 4 percent and evergreen forest, wetlands, and open water comprising 2 percent each. Therefore, most of the watershed has little impervious surface (<2 – 5 percent) (TDEC 2008, October).

The area around CUF is in the Western Highland Rim (71f) subecoregion which is characterized by dissected, rolling terrain of open hills. Streams are characterized by coarse chert gravel and sand substrates with areas of bedrock, moderate gradients, and relatively clear water. (TDEC 2008, October)

The Lower Cumberland River from the KY-TN line (CRM 74.6) to Cummings Creek (CRM 118.3) is classified for use for domestic and industrial water supply, fish and aquatic life, recreation, livestock watering, wildlife, and irrigation. Wells Creek from mile 0.0 to its origin is classified for fish and aquatic life, recreation, livestock watering, wildlife, and irrigation uses (TDEC 2013). No Nationwide Rivers Inventory streams or Wild and Scenic Rivers are located near CUF site. Scott Branch adjacent to CUF has not been assessed, but likely would be designated for fish and aquatic life, recreation, livestock watering & wildlife, and irrigation uses.

The Cumberland River (Barkley Reservoir) downstream of CUF is subject to the influence of the thermal discharges from the plant. A balanced, indigenous population of aquatic life has been supported in this section of the river for most of the time since operation of the plant began in 1973. Under normal conditions, the Cumberland River flow in the vicinity of CUF is primarily dependent upon releases from the USACE Cheatham Dam located approximately 46 miles upstream, and to a lesser extent by downstream releases from Barkley Dam and tributary inflows upstream of the plant. However, in 2007 leakage was discovered in the USACE's Wolf Creek Dam located upstream of CUF at CRM 460.9 which impounds the 65,530-acre Lake Cumberland in Russell County, KY. To accommodate repairs, the reservoir pool was lowered substantially which resulted in reduced flows in the Cumberland River system downstream for approximately 5 years.

During this time of reduced river flows, and even though the plant reduced power production (derated) to comply with thermal discharge limits, a large proportion of the flow in the river was withdrawn by the plant for condenser cooling, thus magnifying the potential for adverse effects to the aquatic community downstream.

Wolf Creek Dam repairs were completed in 2013 and full pool elevations were restored in 2014. At this time, river flows past the plant have returned to historical norms and TVA's biological assessments indicate that biological recovery is occurring, and a balanced, indigenous population of aquatic life is returning to the river downstream of the plant. Barkley Reservoir (TN Waterbody ID TN05130205 015 – 1000) has been delisted from the state 303(d) list as noted in the most recent 2018 TDEC 303(d) list.

3.6.2 On-site Surface Water Features

The proposed wastewater treatment facility site is located in previously disturbed areas. All conveyances and ponds in the vicinity of the project are covered under either the site's NPDES or TMSP permits and are not considered jurisdictional waters of the United States or state.

3.6.3 Existing CUF Wastewater Streams

3.6.3.1 Condenser Cooling Water (CCW)

CUF operates a surface water intake structure that withdraws an average of two thousand and ninety-seven millions of gallons per day (MGD) from the Cumberland River for use as CCW and plant process water (e.g., bottom ash sluice water, fire protection, boiler feed water, miscellaneous equipment cooling water, and miscellaneous wash water). Approximately 98 percent of the water withdrawal is used for cooling, while approximately 2 percent is used for process water. Withdrawn water is returned to the river after appropriate treatment, in compliance with CUF's NPDES Permit Number (No.) TN0005789.

3.6.3.2 Coal Combustion Residuals (CCR)

The existing systems for handling CCR include several areas that receive and treat CCR wastewater streams, including the Bottom Ash Impoundment, the Main Ash Impoundment, the Dry Ash Stack, and the Gypsum Stack (Figure 3-1 (SW)).

The IMP 001 discharge to the CCW channel has an average flow of 21.7 MGD. TVA is required under NPDES Permit No. TN0005789 to meet pH, total suspended solids, oil and grease limits on this discharge (TDEC 2018). This permit also requires that other parameters including arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, thallium, nickel, silver, zinc, antimony, aluminum, selenium, mercury, fluoride, boron, calcium, sulfate, total dissolved solids, cobalt, lithium, molybdenum, and radium 228 and 229 be monitored and reported. The IMP 001 discharge flow above is based on information gathered for the NPDES permit and represents average daily flows on an annual basis.

3.6.3.3 Bottom Ash

Approximately 8 percent of the coal burned at CUF remains as ash, of which approximately 20 percent is bottom ash and 80 percent is fly ash. This breakdown varies slightly.

Bottom ash collects in the bottom of the boiler. It is washed from the boiler bottoms with jets of water and sluiced to the Bottom Ash Impoundment where suspended solids are settled. The bottom ash is excavated and stacked in the Dry Ash Stack and the process water is conveyed through a series of ditches to the Main Ash Impoundment. The Main Ash Impoundment receives runoff from the Dry Ash Stack and Gypsum Disposal Complex via perimeter ditches in addition to the effluent from the Bottom Ash Impoundment. The Main Ash Impoundment discharges under a floating skimmer to the stilling pool. The stilling pool discharges through four spillways into the CCW main plant discharge channel into Barkley Reservoir.

As noted in the recently finalized Cumberland Fossil Plant CCR EIS, a bottom ash dewatering facility has been evaluated to help meet CCR and ELG requirements. This facility would take the currently sluiced bottom ash stream and would separate the solids (allowing disposal in the landfill) and water waste streams.

3.6.3.4 Fly Ash

Approximately 282,000 dry tons of fly ash is stacked in the Dry Ash Stack each year. Approximately 197,000 tons or 70 percent of the fly ash is beneficially reused. This waste stream is handled dry.

3.6.3.5 FGD Scrubber Gypsum Byproduct

The FGD scrubbers at CUF are once-through scrubbers. When the gypsum concentration in the absorbers reaches about 15 percent, solution blow-down is initiated to maintain equilibrium. This blow-downstream is conveyed either:

- To one of the two flexible membrane lined slurry settling channels in the northern portion of the Gypsum Disposal Area

or

- To the SynMat® dewatering facility which dewaters and markets the by-product for wallboard production, and the dewatered (filtrate) wastewater stream is then discharged to the ash impoundment.

The dewatered gypsum is then either placed in the gypsum disposal area or beneficially reused as commercial grade gypsum. The gypsum disposal area currently drains to the Main Ash Impoundment. The scrubbers used by TVA are once-through and not recycle scrubbers (i.e., TVA does not return water to the scrubbers for makeup). Therefore, the discharge concentration of metals and other parameters of concern not cycled up and are discharged at much lower concentrations.

The Selective Catalytic Reduction (SCR) process is used to reduce nitrogen oxides for air pollution control. Ammonia is added to the flue gases as part of the SCR process. Some ammonia may slip through the SCRs. Most of the ammonia slip would be removed from the stack gases in the FGD scrubber for that unit and become part of the FGD scrubber gypsum disposal area wastewater. CUF performs monthly monitoring of IMP 001 for total ammonia nitrogen per NPDES Permit TN0005789.

3.6.3.6 Discharge Characterization

To characterize the current conditions and changes in the IMP 001 discharge, an evaluation of in-stream mixing calculations of chemical characteristics was conducted. This can be useful in predicting potential impacts to water quality that may arise from the changes due to the proposed project.

This evaluation was based on a worst-case scenario just for evaluation purposes based on a CCW flow that is full plant capacity and minimum river flow (1Q10 = 678.8 MGD). In reality, if the flow in the Cumberland River was that low, CUF may have to derate or shut down to avoid thermal impacts to the river.

Results of the surface water mixing analysis under current operations are presented in Table 3-4. For the current operations analysis, metals data were used from the IMP 001 impoundment discharge, Outfall 002 (CCW discharge) and the plant intake, from the most recent 24-hour NPDES sampling conducted in 2016. This information was used to show current operations with the resultant discharge concentrations after mixing with the receiving stream. The projected in-stream mixing concentrations were based on analyses of CUF intake and the minimum one-day low flow that occurs once in 10 years (i.e., the “1Q10”) of

678.8 MGD from the Water Quality Based Effluent Calculations in CUF NPDES Permit TN0005789 Rationale. The 1Q10 stream flow is the regulated low flow condition according to U.S. Geological Survey data for the protection of fish and aquatic life. However, under this low flow condition, the generating units would either need to be derated or would not be able to operate due to thermal issues and the need for more intake water than is available. However, these unlikely circumstances are evaluated because they are deemed conservative and alternative cooling flows are not available.

Table 3-5. In-Stream Mixing Concentrations of Current Operations

	Current Baseline		Current Operations		
Element	Intake Conc.** (mg/L)	Ash Impoundment Discharge** (IMP 001) Conc. (mg/L)	Outfall 002 Discharge** Conc. (mg/L)	Mixing Conc. at Cumberland River 1Q10 (mg/L)	Water Quality Criteria* Conc. (mg/L) @ 100 mg/L hardness
Antimony	<0.0005	<0.0005	<0.0005	0.00025	0.0056
Arsenic	<0.0005	0.00176	<0.0005	0.00025	0.01
Barium	0.0211	0.025	0.02540	0.02435	2.0
Beryllium	<0.0010	<0.001	<0.0010	0.00050	0.004
Cadmium	<0.0004	0.0045	<0.0004	0.00020	0.00025
Chromium	0.0421	0.057	0.00099	0.01104	0.1
Copper	0.00249	0.0040	0.00109	0.00143	0.009
Iron	0.357	0.22	0.16200	0.20969	
Lead	<0.0002	0.043	0.00023	0.00020	0.0025
Manganese	0.0254	0.434	0.03090	0.02956	
Mercury	0.00000201	0.000186	0.00000375	0.0000030	0.00005
Nickel	0.00161	0.1168	0.00870	0.00694	0.052
Selenium	<0.0006	0.110	<0.0006	0.00030	0.005
Silver	<0.0005	<0.002	<0.00050	0.00025	0.0032
Thallium	<0.0005	0.000643	<0.00050	0.00025	0.00024
Zinc	<0.01	0.0855	<0.01	0.00500	0.12

Lbs/day=conc. In mg/L X flow in MGD x 8.34 lbs/gal.
Ash Impoundment 21.7
CCW Flow 2097.032
1Q10 River Flow 678.8
Flows taken from NPDES flow schematic 2016 for permit No. TN0005789 permit renewal.
Mass discharge and loadings were calculated using 0.5 the Minimum Detection Limit.
*TDEC Criteria, Rule 0400-40-03
**Data were taken from most recent NPDES Permit Renewal Date 01/21/16.
The maximum concentration was used as worse case although this number may not be representative of all other samples or the average concentration.
Hardness was taken as part of NPDES sampling therefore a Hardness of 100mg/L was assumed.
Used ½ of the MDL because of continuous BDL results.

Even with that worst-case assumption, the evaluation of the in-stream mixing concentrations shows that all the constituents would meet the TDEC lowest criteria (i.e., the limit equal to minimum of the water quality criteria) except thallium. The thallium exception is the result of the analytical testing methods that can only detect these constituents in concentrations over the TDEC criterion of 0.00024 mg/L. So, these results are due to limitations in testing methods and do not represent true impacts to water quality due to thallium concentrations. The mass balance analysis indicates that the overall impact of current operations does not cause impacts to surface water quality. Any wastes that are generated during the construction process or uncovered during site preparation are subject to the Solid and Hazardous Waste Rules and Regulations of the State of Tennessee.

3.6.3.7 Other Surface Runoff

The existing plant site runoff is regulated under the NPDES Permit No. TN0005789. Existing facilities and BMPs are used to ensure compliance with permit conditions. Some plant runoff is directed through the Main Ash Impoundment system IMP 001 or through the CCW discharge Outfall 002 discussed above. Other storm water discharges associated with the industrial activity at CUF are covered by the Tennessee Storm Water Multi-Sector General Permit for Industrial Activities TNR0510000, Tracking Number TNR051933.

3.7 Groundwater and Geology

Stantec personnel conducted a site visit at the TVA CUF on December 17, 2018, for a visual reconnaissance of site geological and topographical features within the project study area (Figure 1-2). A review of existing literature and groundwater data collected by others and field data collected during this site visit are summarized below.

Site Physiography, Topography, and Geology

The TVA CUF is located within the Highland Rim Physiographic Section of Tennessee which is part of the greater Interior Low Plateaus Physiographic Region of the United States. The Highland Rim section extends from northern Alabama in the south, through middle Tennessee, to southern Kentucky, Illinois, and Indiana. The section has a relatively flat to hilly topography with primarily dendritic drainage patterns.

CUF is situated in the southwestern portion of the Highland Rim in Cumberland City, Tennessee. According to the United States Geological Survey (USGS) topographic map (Cumberland City), CUF is situated between the Cumberland River, located approximately 0.5 miles to the north, and Wells Creek, a perennial tributary to the Cumberland River, located approximately 0.5 miles to the south. Surface elevation at CUF is 400 feet above mean sea level (msl). The general area surrounding CUF decreases from 600 feet above msl in the north to a surface elevation of 400 feet above msl in the south. Wells Creek enters the Cumberland River to the northwest of the plant at an elevation of approximately 360 feet msl. Wooded areas consisting of deciduous and coniferous mixed vegetation occur sporadically throughout the area surrounding CUF.

CUF is located near the center of the Wells Creek Impact Structure, a geologic area affected by a meteor impact which occurred during the Jurassic period, approximately 200 million years ago Before the Common Era (B.C.E.). The approximate diameter of the impact extends approximately seven miles from the small community of Liners, Tennessee, in the east to an area northwest of Brownsville, Tennessee. The impact is expressed in the geologic record by the presence of shatter cones, brecciation, and host and grabben terrane. High angle fractures are present in the Stones River Group and the Knox Dolomite which also indicates an impact affect following bedding origin.

The age of the bedrock ranges from Cambrian (~5.4 million years ago B.C.E.) to Quaternary (~0.0042 million years ago Common Era (C.E.)). Bedrock at CUF is comprised of primarily limestone and dolomite of the Knox Formation, the Stones River Group, and the Hermitage Formation. The bedrock also consists of shale from the Wayne Group. Alluvial deposits are deposited over the bedrock throughout CUF area.

Groundwater and Hydrogeology

Groundwater beneath CUF is located within Quaternary alluvium deposits and shallow bedrock. Groundwater at the site is influenced by water levels in the Cumberland River and Wells Creek. Local groundwater recharge at CUF occurs by infiltration from precipitation and by overland lateral flow. Groundwater from CUF site is expected to ultimately discharge into the Cumberland River and Wells Creek.

Groundwater detection monitoring pursuant to state law requirements was conducted semi-annually at compliance monitoring wells and background monitoring stations surrounding the permitted landfill between April 1995 and January 2009. Collected groundwater samples were analyzed for 17 inorganic constituents. Minimal maximum contaminant levels (MCLs) or statistical upper prediction limit (UPL) exceedances were detected. Detected constituents were associated with compliance well 93-2, which was partially screened in ash. Beginning in 2006 and 2007, increasing concentration trends were observed in several wells for arsenic, cadmium, chromium, cobalt, fluoride, nickel, selenium, and zinc. The CUF Dry Ash and Gypsum Disposal Areas have been placed under an Assessment Monitoring Program pursuant to state law due to exceedances of groundwater protection standards. The site has consistently exceeded the MCL for arsenic since the fall of 2016.

A hydrogeological characterization of CUF site is currently being conducted as part of the TDEC Commissioner's Order No. OGC15-0177 and the associated Environmental Investigation Plan (EIP). The characterization includes an assessment of the groundwater monitoring program and hydrogeology of the site. Three background and three downgradient wells are proposed in the EIP. Upon completion of the hydrogeological characterization, groundwater monitoring plans will be developed which will include additional background and downgradient monitoring wells, if applicable. A revised Groundwater Quality Assessment Plan will be submitted when additional monitoring wells are identified as part of this process and as part of corrective action measures under the CCR rule.

The CCR Rule, published by the EPA on April 17, 2015, requires companies operating coal-fired power plants to study whether constituents in CCR have been released to groundwater from active, inactive, and new CCR impoundments, as well as active and new CCR landfills. The CCR Rule establishes multiple phases of protective groundwater monitoring including baseline sampling, Detection Monitoring, Assessment Monitoring, and Corrective Action. Therefore, in addition to ongoing groundwater monitoring required under State regulations, TVA installed additional wells around the CCR management units, as needed, and TVA implemented a baseline sampling program in 2017. These CCR units included the Stilling Pond (including Retention Pond), Bottom Ash Pond, Gypsum Storage Area, and Dry Ash Stack multi-unit (TVA Fact Sheet, 2019). During detection monitoring, TVA detected statistically significant increases over background constituent levels for several constituents listed in Appendix III of the CCR Rule. Therefore, TVA initiated an assessment monitoring program under the CCR Rule. During assessment monitoring, TVA detected concentrations of arsenic, cobalt, and lithium at statistically significant levels above groundwater protection standards. Accordingly, on April 15, 2019, TVA initiated an assessment of corrective measures for the Stilling Pond (including Retention Pond), Bottom Ash Pond, Gypsum Storage Area, and Dry Ash Stack multi-unit.

Corrective measures at the site will be conducted under the ongoing TDEC Commissioner's Order No. OGC15-0177, pursuant to the state Groundwater Quality Assessment Plan, and under the federal CCR Rule.

Following a literature review and visual site survey of the proposed CUF WWTF Project Study Area, and based upon the plans for WWTF design, construction, and long-term operations, it was determined that the facility is not considered a CCR “Unit” nor is the WWTF Project Study Area located within an area subject to the CCR Rule.

Groundwater monitoring will continue through the operating life of each of the above described CCR units described above and through the prescribed post-closure period TVA Fact Sheet, 2019).

3.8 Wetlands

The area surrounding CUF plant site has been much altered, first through impoundment of the Cumberland River and later through construction, operation, and maintenance of the steam plant. National Wetlands Inventory (NWI) and National Hydrography Dataset (NHD) mapping indicate a channel labeled as “intermittent” flowing west through the project study area and into the location of the proposed WWTF. At this point the channel is shown entering a man-made pond (PUBHx). From this point continuing west and then southeast, the channel is labeled as “artificial path”. The “artificial path” continues for a total of approximately 4,000 feet before being re-labeled as “intermittent”. As described above under the Surface Water section of this document, this, and other drainage features within the proposed project, function as part of the permitted NPDES system.

A field survey was conducted on December 20, 2018, to document the presence of any jurisdictional wetlands within the project study area. The large excavated channel exiting the coal yard and the stormwater ponds exhibit some wetland characteristics such as hydrophytic vegetation (Phragmites) and hydrology indicators (geomorphic position). However, these features are currently functioning as stormwater and wastewater conveyances as part of the site NPDES wastewater treatment system and all have been heavily altered for a long period of time or are man-made. As detailed under the Surface Water section of the EA, the catch basin, metal cleaning pond, and coal yard runoff ponds are not jurisdictional under Sections 401 and 404 of the Clean Water Act, but rather, are part of a permitted NPDES wastewater treatment system, covered under Section 402 of the Clean Water Act. No other wetland-like features were observed.

3.9 Floodplains

A floodplain is the relatively level land area along a stream or river that is subjected to periodic flooding. The area subject to a one percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2 percent chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate construction in the 100-year floodplain to ensure that the project is consistent with the requirements of Executive Order (EO) 11988. Floodplains within the project area are shown in Figure 3-1.

Figure 3-1. Project Boundary (yellow) and Wastewater Treatment Plant (red) with Floodplains

The proposed project would be located between Cumberland River miles 102.7 and 103.5, left descending bank, on Lake Barkley, in Stewart County, Tennessee. The USACE operates Lake Barkley. The flood insurance study (FIS) now in effect in Stewart County, Tennessee, is dated 2010. There is no flood profile or floodway data table for the Cumberland River in the 2010 Stewart County FIS. According to information provided by the USACE, the 100-year flood elevation would vary between 379.6 feet downstream to 379.8 feet upstream, referenced to National Geodetic Vertical Datum (NGVD) 1929.

The Standard Project Flood (SPF) is a term used by the USACE and is defined as a flood with a frequency range between once in 200 years and once in 1,000 years. For purposes of this environmental review, TVA is substituting the SPF for the 500-year flood elevation. According to information provided by the USACE, the SPF elevation in the project area varies from 385.2 feet downstream to 385.8 feet upstream, referenced to NGVD 1929.

In June 2018, FEMA published a Preliminary FIS (PFIS) for Stewart County. Based on Profile 044P in the 2018 PFIS, the 100-year flood elevation on the Cumberland River would be constant at about elevation 381, referenced to North American Vertical Datum (NAVD) 1988. There is no 500-year flood profile in the 2018 PFIS; therefore, the existing USACE SPF data mentioned above is considered the best available data for the foreseeable future.

3.10 Natural Areas, Parks and Recreation

3.10.1 Natural Areas

Natural areas include managed areas, ecologically significant sites, and Nationwide Rivers Inventory streams. This section addresses natural areas that are within, immediately adjacent to (within 0.5 miles), or within a five-mile radius of the project area. A review of the TVA Natural Heritage database indicates that there are no natural areas within or immediately adjacent to the project footprint. Created as a result of mitigation proceedings with the USACE following the formation of Lake Barkley, Cross Creeks National Wildlife Refuge is located 0.6 miles northwest of the project footprint. Its primary purpose is to provide feeding and resting habitat for migratory birds with an emphasis placed on providing habitat for wintering waterfowl. Ranging from 0.7 miles east to 3.3 miles south of the project footprint are a series of four crater impacts known as the Wells Creek cryptoexplosive structures. These unique structures were formed by the sudden, explosive release of energy and exhibit intense, often localized rock deformation with no obvious relation to volcanic or tectonic activity. Located 3.5 miles west of the project footprint is Stewart State Forest. This 4,226-acre forest facilitates recreational activities that include hunting, hiking, and mountain biking.

3.10.2 Parks and Recreation

No public recreation use occurs within the proposed project footprint. However, one developed public recreation area is located in the immediate vicinity of the project. This area includes a boat launching ramp, courtesy pier, and a parking lot that can accommodate up to 15 vehicles with boat trailers. Cumberland City Road (Route 233) provides access to the ramp. Although this ramp is located on Cumberland Power Plant property and is managed by TVA, it is located just outside of the project footprint. The public uses the ramp to access this section of the Cumberland River for fishing and other boating activities.

3.11 Cultural and Historic Resources

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, objects, and locations of important historic events that lack material evidence of those events. Cultural resources that are included or considered eligible for inclusion in the National Register of Historic Places (NRHP) maintained by the National Park Service are called historic properties. Federal agencies are required by the National Historic Preservation Act and by NEPA to consider the possible effects of their undertakings on historic properties.

To be included or considered eligible for inclusion in the NRHP, a cultural resource must possess integrity of location, design, setting, materials, workmanship, feeling, and association. In addition, it must also meet one of four criteria: (1) association with important historical events; (2) association with the lives of significant historic persons; (3) having distinctive characteristics of a type, period, or method of construction, or representing the work of a master, or having high artistic value; or (4) having yielded or having the potential to yield information important in history or prehistory.

No archaeological surveys have taken place previously within the Area of Potential Environmental Effects (APE). Files at the Tennessee Division of Archaeology in Nashville show that one archaeological site (40SW47) was recorded previously on a wooded hill near Cumberland City Road, but a subsequent archaeological investigation (Duvall 1995) failed to verify the site's location. No archaeological sites have been recorded within the APE. Construction of CUF began just after the passage of the National Historic Preservation Act of 1966, but prior to issuance of the Advisory Council on Historic Preservation's regulations implementing the Act. There were no guidelines for federal agencies in following the Act at that time, and TVA was not required to consider the potential effects of CUF construction on archaeological sites or above-ground historic properties.

The 1965 edition of the USGS Cumberland City, Tennessee 7.5-minute topographic quadrangle map shows landforms that existed in the APE prior to construction of CUF. The APE includes what were then low uplands separating the Cumberland River from Wells Creek. Elevations in the APE ranged from approximately 450 feet above mean sea level (amsl) in locations near the powerhouse and exhaust stacks, to less than 375 along the banks of Wells Creek. Construction of CUF required removing all soil in the APE, filling voids in the bedrock with concrete and fill dirt and creating a level surface to support foundations and associated facilities (TVA 1971). These actions completely reconfigured the landscape. All areas within the APE were affected by plant construction or, by the construction of the impoundments. Given this history of construction, TVA finds that the APE does not contain intact archaeological sites or features.

No resources listed on the NRHP are located in the APE. The Tennessee Historical Commission Online Viewer indicates one previously inventoried above-ground resource is located within the half mile radius of the project area: SW-797, the Milton Brunson house in Cumberland City, but it was later determined to be outside the APE. The high number of above-ground resources (37) recorded in Cumberland City indicates that an historic architectural survey was completed previously in this small municipality. The remainder of those resources are outside the half mile radius, and also would likely not have direct views WWTF and are therefore outside the indirect effects APE. Comparison of the 1965 topographic quadrangle map with modern satellite imagery indicates that two structures, a house and a nearby barn located 0.42 miles south of the proposed WWTF, are at least 53 years old. These structures could potentially have historic significance, given their age. In

2003, TVA evaluated CUF as ineligible for inclusion in the NRHP due to a loss of integrity resulting from the installation of emissions controls equipment and addition of many structures subsequent to the plant's original construction. TVA consulted with the Tennessee State Historic Preservation Officer (SHPO), who agreed with this determination.

3.12 Solid Waste and Hazardous Waste

On April 17, 2015, EPA published its final rule governing disposal of CCR produced by electrical generating companies. The rule became effective on Oct. 19, 2015 and regulates CCR generated by electrical/power plants as a non-hazardous solid waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA). Although the EPA deferred action on its previous Bevill regulatory determination in 2015, leaving open the possibility that CCRs could be regulated as hazardous waste in the future, no such action has occurred to date.

Stantec personnel conducted a site visit to the TVA CUF on December 17, 2018, which included a visual assessment of site's current land use and any observable indications of past uses and conditions within the project area that may indicate the presence of Recognized Environmental Conditions (RECs) within the project study area (Figure 1-1). A review of available site literature for CUF as well as visual data collected during the site visit is summarized below.

Solid waste generally refers to materials arising from animal and human activities that are discarded as unwanted and useless. Solid waste is commonly generated from industrial, residential, mining, agricultural, and commercial activities in a given area and may include materials such as refuse, sanitary wastes, contaminated environmental media, scrap metals, wastewater treatment plant sludge, nonhazardous air pollution control wastes, various nonhazardous and industrial waste (e.g., coal combustion residuals). In some cases, solid wastes may appear in liquid or semi-solid, or contained gaseous material.

Currently, any solid waste generated at CUF is managed in accordance with federal and state requirements. The EPA regulates solid waste under Subtitle D of the RCRA, which bans the open dumping of waste and sets minimum federal criteria for the operation of municipal waste and industrial waste landfills, including design criteria, location restrictions, financial assurance, corrective action (cleanup), and closure requirement (https://www.epa.gov/rcra, 2018). In Tennessee, the Tennessee Department of Environment and Conservation (TDEC) Division of Solid Waste Management operates under the authority of the Solid Waste Management Act of 1991 (T.C.A. §68-211-101 et seq.) and plays a lead role in implementing RCRA Subtitle D.

In general, the EPA defines hazardous waste as any waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. Hazardous waste materials may include any solid waste or combination of solid waste that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health or the environment when released into the environment (40 CFR Part 261). In addition to the EPA, hazardous materials are regulated in the U.S. by laws and regulations administered by the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC) and each has its own definition of a "hazardous material." All of these agencies have their own unique definition for hazardous waste.

In Tennessee, TDEC's Hazardous Waste Management Program regulates hazardous waste generation, transportation, storage, treatment, and disposal. It has authority over facilities subject to EPA RCRA Subtitle C and is overseen by EPA Region 4. The Hazardous Waste Management Program operates under the authority of the Hazardous Waste Management Act of 1977 (T.C.A. §68-212-101 et seq.) and various Hazardous Waste Management rules.

EXISTING CUF WASTE PRODUCTION

Solid Waste

The primary waste generated at CUF is CCR, which is considered a solid waste by TDEC under Rule 0400-11-01-.01 which states that special wastes include sludges, bulky wastes, pesticide wastes, industrial wastes, combustion wastes, friable asbestos and certain hazardous wastes exempted from RCRA Subtitle C requirements.

CUF has historically produced three CCRs: fly ash, bottom ash, and gypsum as a result of the FGD process. Typically, the gypsum is commercial grade and is sold for wallboard manufacturing. TVA has managed the storage of CCR materials at CUF in a combination of dry stacks and impoundments. The 2018 CUF Coal Combustion Residuals Management Operations EIS evaluated the impacts of converting CUF's wet ash handling system to dry collection methods. Currently, bottom ash generated by the operating units is sluiced to the existing Bottom Ash Impoundment where most of the material settles out. The settled bottom ash is excavated and stacked in the Fly Ash Stack. Water from the Bottom Ash Impoundment flows to the Main Ash Impoundment and Stilling Impoundment before being discharged to the CCW and ultimately is discharged into the Cumberland River through a permitted outfall. Fly ash is transported in dry form to the Fly Ash Stack. Gypsum is dewatered and conveyed to an adjacent wall-board manufacturer or disposed in the Gypsum Stack or to lined channels where it is dewatered, stockpiled for later use, or disposed in the Gypsum Stack located to the south of the proposed WWTF. TVA estimates that CUF generates an annual average of approximately 282,000 tons of fly ash, 70,000 tons of bottom ash and 629,000 tons of gypsum. CUF currently holds a solid waste permit related to the on-site disposal of these materials.

Hazardous Waste

According to the EPA search engine, https://www3.epa.gov/enviro/, CUF is listed as a small quantity generator of hazardous waste and has historically reported generation of hazardous waste under 14 different waste codes. As a small quantity generator, CUF generates between 100 kg and 1,000 kg of hazardous waste per month. Hazardous waste generated at CUF is managed and disposed in accordance with established TVA programs, in addition to applicable local, state, and federal regulations.

3.13 Land Use and Prime Farmland

The purpose of the Farmland Protection Policy Act (FPPA) of 1981 is to minimize the extent to which federal programs, including technical assistance or financial assistance, contribute to the unnecessary and irreversible conversion of important farmland to nonagricultural uses. The FPPA encourages federal agencies or other entities utilizing federal funds or federal land to consider alternative actions that could lessen the adverse effects on farmland. The FPPA, at 7 United States Code (USC) § 4201 *et seq.*, requires all federal agencies to evaluate impacts to prime and unique farmland prior to permanently converting to land use incompatible with agriculture. Prime farmland, as defined by the U.S. Department of Agriculture (USDA), is land that has the best combination of physical and chemical

characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

Portions of CUF WWTF project area contain soils that have been designated as Prime Farmland or Prime Farmland types – if drained and either protected from flooding or not frequently flooded during the growing season – by the USDA (see Figure 3-2). Prime Farmland soil types within the proposed borrow areas and access road are predominantly Lindell silt loam (32.6 percent), with lesser amounts of Wolftever silt loam (4.5 percent) and Egam silty clay loam (1.6 percent). Development of the laydown areas and, WFGD WWTF, would involve clearing and grading of designated Prime Farmland soils. However, the entire CUF WFGD project area has been heavily disturbed and no longer supports agricultural activities. Based on historical aerials, previous knowledge of the site, and visual site reconnaissance, soils located within CUF WFGD project area have been previously developed and no longer display native soil fertility qualities. Therefore, little to no native Prime Farmland soils remain in these areas. In addition, not all of the areas in the limit of disturbance would be graded; some are shown inside the footprint identified in Figure 1-2 because they will have features that don't require grading or disturbance.

Approximately 18,600 acres (21.3 percent) of the area within five miles of CUF WFGD site have soils classified as Prime Farmland. CUF WFGD project area consists of less than 0.22 percent of soils currently designated at "Prime Farmland" soils by the USDA. Designated Prime Farmland soils by the USDA within the project study area are summarized in Table 3-6.

Table 3-6. Prime Farmland Soils within CUF WWTF Project Area by the USDA

Project Type	Prime Farmland Soils (Acres)	Prime Farmland if Drained and Either Protected from Flooding or Not (Acres)	Non-Prime Farmland Soils (Acres)
Proposed FGD WWTF Stage A, B, and C	2.0	0	3
Additional Affected Areas and Laydown Areas	38	1.7	0
Grand Total	**40**	**1.7**	**112**

Source: *USDA NRCS 2019*

Figure 3-2. Prime Farmland Soils within CUF WWTF Project Area Roadway Transportation

3.14 Roadway Transportation

CUF is located just west of Cumberland City, Tennessee, on the Cumberland River. The plant is served by highway, railway, and waterway modes of transportation. The transportation network surrounding CUF includes roads and bridges, rail lines, and navigable waterways. Interstate Highway 24 is approximately 25 miles to the east of CUF.

Traffic generated by existing operations at CUF is composed of a mix of cars and light duty trucks, as well as medium duty to heavy duty trucks. The proposed wastewater treatment facilities would be wholly located on CUF site.

State highways provide mobility and access in the immediate vicinity of CUF. Principal access to CUF is via SR (State Route) 233 (Cumberland City Road), which is two lanes wide. SR 149, another two-lane roadway, is approximately 1.2 miles east of CUF. The Cumberland City Ferry, which operates just east of CUF, provides a connection for SR 46 across the Cumberland River. To the west, SR 49 connects SR 233 to US 79 at Dover, Tennessee. US 79 crosses the Cumberland River at Dover.

The 2013 Annual Average Daily Traffic (AADT) volumes (most recent available) on the roadways in the immediate vicinity of CUF including SR 233 (Cumberland City Road), and SR 49 indicate few to no delays or reduced speeds due to heavy traffic volumes.

Generally, roadway level of service in the area of the plant can be classified as Level of Service A, which is a qualitative measure of roadways and intersections indicating freely flowing traffic with traffic moving at posted speed limits, with free maneuverability between lanes, and virtually no intersection delays due to traffic queues.

3.15 Visual Resources

This EA reviews and classifies the visual attributes of existing scenery, along with the anticipated attributes resulting from the proposed action. The classification criteria used in this analysis are adapted from a scenic management system developed by the U.S. Forest Service (USFS) and integrated with planning methods used by TVA (USFS 1995).

The visual landscape of an area is formed by physical, biological, and man-made features that combine to influence both landscape identifiability and uniqueness. Scenic resources within a landscape are evaluated based on several factors that include scenic attractiveness, integrity, and visibility. Scenic attractiveness is a measure of scenic quality based on human perceptions of intrinsic beauty as expressed in the forms, colors, textures, and visual composition of each landscape. Scenic integrity is a measure of scenic importance based on the degree of visual unity and wholeness of the natural landscape character. The varied combinations of natural features and human alterations both shape landscape character and help define their scenic importance. The subjective perceptions of a landscape's aesthetic quality and sense of place is dependent upon where and how it is viewed.

The scenic visibility of a landscape may be described in terms of three distance contexts: (1) foreground, (2) middle-ground, and (3) background. In the foreground, an area within 0.5 miles of the observer, individual details of specific objects are important and easily distinguished. In the middle-ground, from 0.5 miles to four miles from the observer, object characteristics are distinguishable, but details are weak and tend to merge into larger patterns. In the distant parts of the landscape, the background, details, and colors of objects are not normally discernible unless they are especially large, standing alone, or have a

substantial color contrast. In this assessment, the background is measured as 4 to 10 miles from the observer. Visual and aesthetic impacts associated with a particular action may occur as a result of the introduction of a feature that is not consistent with the existing viewshed. Consequently, the character of an existing site is an important factor in evaluating potential visual impacts.

For this analysis, the affected environment is considered to include the project areas within CUF that encompass both permanent and temporary impact areas, as well as the physical and natural features of the landscape. Parts of CUF property are devoid of vegetation and large areas been heavily disturbed by industrial development.

The most dominant visual elements of CUF include the 1,000 foot-high and 365-foot emissions stacks and connecting transmission lines. Other major visual components of the site include the powerhouse buildings, emission control buildings and ducts, and the coal pile and coal handling facilities.

The proposed CUF WFGD project area is located within the central portion of CUF and is surrounded by existing development features including gypsum above ground storage, the powerhouse and coal yard, ash storage areas, surge tanks, and other buildings and equipment intended to transmit, store, and treat water and wastes and manage the fuel used to generate electrical power at the Cumberland facility. Access roadways are typically utilized for both daily operations and new construction employee and contractor traffic as well as deliveries and removal of materials from the site.

The industrial CUF facility provides visual contrast to the surrounding rural and undeveloped, mostly wooded landscape. Predominant focal points include the existing smokestack and wet FGD stacks and the plumes they emit. Views of the plumes are heavily influenced by seasonal variations in weather and atmospheric conditions and they are typically more visible during the winter.

The foreground, which includes the proposed CUF WFGD project area and surrounding built environment, dominates the views. In the middle-ground and background these views are softened by heavily wooded areas which characterize the areas around CUF.

There are no sensitive viewing receptors within CUF WFGD project area. The nearest residential areas are in Cumberland City, approximately 0.2 miles from the eastern edge of CUF property. There are numerous residences in proximity to the western boundary of CUF property (some are within 100 feet) along Scotts Chapel Road, near the proposed on-site landfill location. The nearest church and cemetery are the United Methodist Church and cemetery in Cumberland City, approximately 0.4 miles east of CUF property. Groups that have direct views of the project areas include authorized employees, contractors, and visitors to the plant site. Views of CUF WFGD project area are generally restricted to the foreground (i.e., within 0.5 miles) and include residents and visitors of the adjacent Cumberland City. In other directions, however, nearby vegetation and the local topography may buffer views of the plant.

3.16 Noise

Noise is defined as unwanted sound caused by human activities that is added to the natural acoustic environment of an area. The intensity or loudness of sound is measured on a logarithmic scale in units called decibels (dB). However, since the human ear does not hear sound waves of different frequencies at the same subjective loudness, an adjustment or weighting of the high-pitched and low-pitched sounds is made to approximate how an average person hears sounds. When such adjustments to the sound levels are made, they are called "A-weighted levels" and are usually labeled "dBA". A noise level change of 3 dBA or less is barely perceptible to average human hearing. However, a 5 dBA change in noise level is clearly noticeable. A 10 dBA change is perceived as a doubling or halving of noise loudness; whereas a 20 dBA change is considered a "dramatic change" in loudness. Table 3-6 summarizes some common A-weighted indoor and outdoor noise levels for noise abatement criteria.

Table 3-7. Noise Abatement Criteria (23 CFR, Appendix Table 1, Part 772)

[Hourly A-Weighted Sound Level decibels (dB(A)) [1]].

Activity Category	Activity Leq(h)	Criteria [2] L10(h)	Evaluation Location	Activity Description
A	57	60	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B [3]	67	70	Exterior	Residential.
C[3]	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, historic structures and sites, schools, television studios, trails, and trail crossings.
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E [3]	72	75	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F				Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G				Undeveloped lands that are not permitted.

[1] Either Leq(h) or L10(h) (but not both) may be used on a project.
[2] The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[3] Includes undeveloped lands permitted for this activity category.

Construction activities from vehicle traffic and construction equipment create sounds that are normally unwanted. They are referred to as construction noise. The level of construction noise is never constant. Therefore, it is necessary to use a statistical descriptor to describe the varying construction noise levels. The equivalent continuous sound level (Leq) is the statistical descriptor used in a noise impact analysis. The Leq sound level is the steady A-weighted sound level, which would produce the same A-weighted sound energy over a stated period of time. The day-night sound level (Ldn) is the 24-hour equivalent sound level Leq, which incorporates a 10 dBA correction penalty for the hours between 10 p.m. and 7 a.m. to account for the increased annoyance during this period and the fact that when most people are more sensitive to noise while they are trying to sleep. The EPA (1974) guidelines recommended that Ldn not exceed 55 dBA for outdoor residential areas. The U.S. Department of Housing and Urban Development (HUD) considers a Ldn of 65 dBA or less to be compatible with residential areas (HUD 1985). These levels are not regulatory goals but are “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (EPA 1974). For traffic-related noise, the Federal Highway Administration (FHWA) has set a threshold of 67 dBA as the sound level at which noise abatement should be considered. The Tennessee Department of Transportation (TDOT) has adopted this same threshold for projects in Tennessee.

Typical background Ldns for rural areas range between 35 and 50 dB whereas higher-density residential and urban areas background noise levels range from 43 dB to 72 dB (EPA 1974). Background noise levels greater than 65 dBA can interfere with normal conversation, watching television, using a telephone, listening to the radio, and sleeping. Ambient noise within the project study area is anticipated to fall within the typical range described above for rural areas.

3.16.1 Noise Receptors

The area surrounding CUF consists, for the most part, of semi-rural, sparsely populated areas along the outer western limits of the small town of Cumberland City, Tennessee. The southernmost portion of CUF, which includes the proposed WFGD project area WWTF and laydown areas is located on CUF property and is bordered by the gypsum and dry ash stack areas. The western portion of CUF WFGD project area, which includes the laydown areas is bordered by the recently constructed PWBs. The northwestern portions of CUF WFGD project area are bordered by the Cumberland River and the NPDES outfall channel. Additional laydown areas located in the north central portion of CUF WFGD project area are bordered by CUF plant and Coal Yard Runoff Basin. Finally, the easternmost portion of CUF WFGD project area, is bordered by a few pasture and wooded areas, as well as a large detention pond along the northeastern corner of the site.

The noise environment of the proposed CUF WFGD is characterized by noise from industrial activities at CUF, transportation noise, and construction noise. The closest homes are located approximately 3,000 to 4,500 feet east of the proposed WFGD project area. In general, the population density within one mile of CUF is very low. The closest sensitive receptors to the laydown areas are seven homes and one small restaurant (Mac’s Place) located approximately 1,200 to 2,000 feet east and southeast of the laydown areas along Old Highway 149 and SR 249.

3.16.2 Sources of Noise

There are numerous existing sources of noise at CUF. Operations at the existing coal plant generate varying amounts of environmental noise. Noise generating activities associated with the existing plant include coal unloading activities, periodic dozer operations associated with coal pile management, and truck operations. Existing noise emission levels associated with these activities typically range from 59 to 87 dBA when measured 50 feet from the source (TVA 2014).

The level of construction noise is dependent upon the nature and duration of the project. Construction activities for most large-scale projects would be expected to result in increased noise levels due to operation of construction equipment on-site and the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. Noise levels associated with construction activities would increase ambient noise levels adjacent to the construction site and along roadways used by construction-related vehicles. Construction noise is generally temporary and intermittent in nature as it generally occurs on weekdays during daylight hours which minimizes the impact to receptors.

3.17 Socioeconomics and Environmental Justice

Socioeconomic characteristics of resident populations are assessed using 2010 Census and 2011-2015 American Community Survey (ACS) 5-year estimates provided by the U.S. Census Bureau (USCB 2017a; 2017b). Employment and housing data are provided by the 2011-2015 ACS.

For socioeconomic and Environmental Justice (EJ) analyses, TVA used data from a spatial extent and scale that provides the most accurate and up-to-date picture of socioeconomic characteristics near the proposed action. The spatial extent for the analysis of socioeconomic impacts is set as a five-mile radius buffer around CUF WWTF project area.

Socioeconomic data are assessed by block groups (i.e., the second smallest census geography unit). This spatial scale of analysis simultaneously provides fine detail while maintaining the greatest availability of data.

3.17.1 Demographics

The communities surrounding CUF are rural and not densely populated (e.g., 65.6 people per square mile; USCB 2017a). The nearest population centers are the rural municipalities of Cumberland City, Erin, Dover, and Woodlawn, Tennessee. Overall, there are approximately 19,704 people living near the study boundaries, which breaks down to 10,388 people living within five miles of CUF.

In comparison to the population of the surrounding counties (207,556 people), the area around CUF contains only five percent of the regional population. Since 2010, the population around CUF has decreased by approximately 0.1 percent. Overall, population losses in the project area are small, mostly in line with the surrounding counties, and are more indicative of the general area.

The population around CUF is primarily comprised of white people (94.7 and 92.3 percent, respectively). The state of Tennessee is 77.8 percent white in comparison. Minority populations in the study area are small. Black, or African American, is the largest racial minority group, comprising 3.5 percent of the population surrounding CUF.

Persons under the age of 18 make up 22.5 percent of the population around CUF. Numbers of persons greater than 65 years old around CUF (15.5 percent) are similar to numbers throughout Tennessee (14.6 percent).

Overall, the study area contains approximately 10 percent fewer children than Tennessee overall and approximately 4 percent fewer retirees than the surrounding region, which implies that no vulnerable age groups are concentrated within the proposed study boundaries.

3.17.2 Economic Conditions

Median household incomes for neighborhoods around CUF ($43,773) are comparable to Tennessee ($45,219). Additionally, persons living below the poverty line around CUF (17.7 percent) are at or slightly above the state average of 17.6 percent.

The top three industries for civilian employment in Stewart County are: (1) educational, health care, and social services at 23.2 percent, (2) retail trade at 13.1 percent, and (3) manufacturing at 11.8 percent.

The total employed civilians in the communities surrounding CUF is 3,880. The civilian unemployment rate around CUF is 11.2 percent. This rate is 2.8 percent higher than the state average (8.4 percent). Additionally, unemployment for the total employable population around CUF is 5.9 percent or only 0.8 percent above the state rate of 5.1 percent.

3.17.3 Community Facilities and Services

Community facilities and services are public or publicly-funded facilities such as police protection, fire protection, schools, hospitals and other health care facilities, libraries, daycare centers, churches, and community centers. Direct impacts to community facilities occur when a community facility is displaced or access to the facility is altered. Indirect impacts can also occur when a proposed project results in a population increase that would generate greater demands for services and affect the delivery of such services. When applicable, the study area for the evaluation of impacts to community services is the service area of various providers, otherwise a secondary study area defined for the purposes of a socioeconomic analysis may be defined. In this case, the study areas for community impacts are the same as socioeconomic analyses described above.

Community services available to the communities surrounding CUF include fire and emergency services, law enforcement, churches, cemeteries, and schools. Specifically, there are 11 churches, six cemeteries, three government offices (i.e., one post office and two wastewater treatment buildings), two schools, one fire department, and one police department located within a five-mile radius of CUF.

3.17.4 Environmental Justice

On February 11, 1994, President Clinton signed EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. EO 12898 mandates some federal-executive agencies to consider EJ as part of the NEPA. EJ has been defined as the fair treatment and meaningful involvement of all people regardless of race,

color, national origin, or income (EPA 2016b) and ensures that minority and low-income populations do not bear disproportionately high and adverse human health or environmental effects from federal programs, policies, and activities. Although TVA is not one of the agencies subject to this order, TVA routinely considers EJ impacts as part of the project decision-making process.

Guidance for addressing EJ is provided by the CEQ's Environmental Justice Guidance under the National Environmental Policy Act (CEQ 1997). The CEQ defines minority as any race and ethnicity, as classified by the USCB, as: Black or African American; American Indian or Alaska Native; Asian; Native Hawaiian and other Pacific Islander; some other race (not mentioned above); two or more races; or a race whose ethnicity is Hispanic or Latino (CEQ 1997). Low income populations are based on annual-statistical poverty thresholds also defined by the USCB.

Identification of minority populations requires analysis of individual race and ethnicity classifications as well as comparisons of all minority populations in the region. Minority populations exist if either of the following conditions is met:

- The minority population of the impacted area exceeds 50 percent of the total population.
- The ratio of minority population is meaningfully greater (i.e., greater than or equal to 20 percent) than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997).

Low-income populations are those with incomes that are less than the poverty level, which varies by the size of family and number of related children under 18 years (CEQ 1997). The 2015 USCB Poverty Thresholds states the poverty threshold as an annual household income of $24,257 for a family of four (USCB 2017c). For an individual, an annual income of $12,082 is the poverty threshold. A low-income population exists if either of the following two conditions are met:

- The low-income population exceeds 50 percent of the total number of households.
- The ratio of low-income population significantly exceeds (i.e., greater than or equal to 20 percent) the appropriate geographic area of analysis.

For this assessment, three geographic areas of analysis (i.e., census block group, county, and state) were used to determine potential EJ populations. Potentially affected communities were defined as any census block group that intersected the five-mile radius study boundary around CUF. Demographic data by block group were then compared to county and state-wide data.

Total minority population (i.e., all non-white racial groups and Hispanic or Latino, combined) comprise 27.1 percent of the population of the state of Tennessee. Of the one county considered, minority populations comprise 8.9 percent of the total population of Stewart County.

Minorities comprise between 2.9 to 16.3 percent of the population of block groups intersecting the study area around CUF (average of 6.9 percent). None of these block groups exceed EJ thresholds when compared to reference geographies.

The poverty rate in Tennessee is 17.6 percent. Stewart County's poverty rate is 19.5 percent. The average poverty rate of the populations around CUF is 17.7 percent and ranges from 5.3 to 29.9 percent between block groups. None of these block groups exceed the EJ threshold when compared to reference geographies.

3.18 Health and Safety

3.18.1 Public Health and Safety

Workplace health and safety regulations are designed to eliminate personal injuries and illnesses from occurring in the workplace. These laws may comprise both federal and state statutes. OSHA is the main statute protecting the health and safety of workers in the workplaces. The Tennessee Department of Labor and Workforce Development has adopted federal OSHA standards. TVA's Safety Standard Programs and Processes would be strictly adhered to during the construction and operation of the proposed action. The safety programs and processes are designed to identify actions required for the control of hazards in all activities, operations, and programs. It also establishes responsibilities for implementing OSHA and state requirements.

The routine operations and maintenance activities at CUF reflect a safety-conscious culture, and activities are performed consistent with OSHA and state standards and requirements and specific TVA guidance. Personnel at CUF are conscientious about health and safety having addressed and managed operations to reduce or eliminate occupational hazards through implementation of safety practices, training, and control measures.

CUF has safety programs and BMPs in place to minimize the potential of safety incidences. These include but are not limited to such programs as the following:

- Operations and Maintenance Plans
- Hazard Communication
- Housekeeping
- Contractor Evaluation and Acceptance
- Competent Person
- Standard Operating Procedures
- Project Safety Plans
- Ground Disturbance
- Lifting Operations
- Confined Space Procedures
- Safety Reviews
- Compliance Audits
- Energy Isolation (Lockout/Tagout)
- Cutting, Burning, Welding and other "Hot Work"
- Incident Reporting and Investigation
- Personal Protective Equipment
- Hearing Conservation
- H&S Training
- Emergency Spill/Release Plans
- Emergency Response Plan
- Hazard Analysis
- Management of Change

It is TVA's policy that contractors have a site-specific health and safety plan in place prior to conducting construction activities at TVA properties. The contractor site-specific health and safety plans address the hazards and controls as well as contractor coordination for various construction tasks. A health and safety plan would also be required for workers responsible for operations after construction is complete.

The potential offsite consequences and emergency response plan are discussed with local emergency management agencies. These programs are audited by TVA no less than once every three years and by EPA periodically.

Health hazards are also associated with emissions and discharges from the facility as well as accidental spills/releases at the plant and/or along pipelines. Mitigative measures are used to ensure protection of human health which includes the workplace, public, and the environment. Applicable regulations and administrative codes that prescribe monitoring requirements may include those associated with emergency management, environmental health, drinking water, water and sewage, pollution discharge, air pollution, hazardous waste management, and remedial action.

Additionally, wastes generated by operation of the plant can pose a health hazard. Wastes including solid wastes, hazardous waste, liquid wastes, discharges, and air emissions are managed in accordance with applicable federal, state, and local laws and regulations and all applicable permit requirements. TVA is committed to complying with all applicable regulations, permitting, and monitoring requirements. Furthermore, waste reduction practices are employed including recycling and waste minimization.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this EA. Impacts would occur from construction and operation of the WFGD wastewater treatment facility. Impacts can also occur both directly at the site of the alternatives as well as off-site. Cumulative impacts from the proposed project are further discussed at the end of this chapter.

4.1 Air Quality

4.1.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed and no on-site project-related impacts to air quality would occur.

4.1.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B.

Development of this alternative would require construction equipment for site preparation, foundation development, and building construction. Construction-related air quality impacts would be related primarily to operation of internal combustion engines and site preparation activities.

Combustion of gasoline and diesel fuels by internal combustion engines (vehicles, generators, construction equipment, etc.) would generate local emissions of particulate matter (PM), nitrogen oxides (NO_X), CO_2, CO, volatile organic compounds (VOC), and SO_2 during the site preparation and construction period. However, new emission control technologies and fuel mixtures have significantly reduced vehicle and equipment emissions. Additionally, it is expected that all vehicles would be properly maintained which would also reduce emissions. Therefore, emissions from internal combustion engines during construction and operation would result in minor short-term local effects on air quality due to the relatively low number of vehicles, adherence to equipment maintenance requirements, and continued improvement by the manufacturers of emission control measures and fuel blends. To further minimize these impacts, TVA would also ensure that all construction vehicles would be properly maintained, and idling times would be kept to a minimum to reduce emissions. Fugitive dust from site development and building/facilities construction would be minimized during the construction period. Fugitive dust would be controlled using wet suppression and other BMPs, as outlined in the fugitive dust control plan under CUF's existing Title V permit.

Air quality impacts from on-site construction activities would be temporary. Air emissions would be dependent upon both man-made factors (e.g., intensity of activity, control measures) and natural factors (e.g., wind speed, wind direction, soil moisture). However, even under unusually adverse conditions, these emissions would have, at most, a minor transient impact on offsite air quality and would be well below applicable ambient air quality standards.

4.1.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this assessment conservatively assumes that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to air quality because the completion of Stage C was assumed in determining the limits of disturbance/construction.

4.2 Climate Change

4.2.1 Alternative 1 - No Action

Under this alternative, the wastewater facilities would not be constructed, and there would be no on-site project-related emissions that would generate GHGs and contribute to climate change. The No Action Alternative would not be expected to result in increases in regional GHG levels or impact climate change.

4.2.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B.

Construction-related emissions (primarily mobile sources) would occur during site preparation and facility construction activities. A small number of vehicles associated with facility service requirements and employee access would be expected during operation of the facility. Due to the small number of vehicles and construction equipment involved, only a minor temporary increase in CO_2 emissions would be anticipated as a result of the construction the wastewater facility. Such emission levels are *de minimis* in comparison to the regional and world-wide volumes of CO_2. Local and regional greenhouse gases (GHG) levels would not be expected to be adversely affected by emissions from facility construction or operations and would therefore not contribute noticeably to climate change.

4.2.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this assessment conservatively assumes that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3, this would be expected to generate similar amounts of CO_2 emissions as Alternative 2. This alternative would not cause more than a *de minimis* addition to local and regional GHG levels during facility operations and would therefore not contribute noticeably to climate change.

4.3 Terrestrial Ecology

4.3.1 Vegetation

4.3.1.1 Alternative 1 - No Action

Under the No Action Alternative, the wastewater treatment system would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. No impacts to vegetation would occur because on-site conditions would not deviate from their current degraded status and no vegetation communities would be altered.

4.3.1.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and TVA would implement Stages A and B.

Adoption of Alternative 2 would involve permanent direct impacts (construction impacts) to 4.6 acres in the form of earth-moving operations and construction of the WFGD wastewater treatment system. This includes permanent impacts to 2.4 acres of *Sorghum halepense-Schedonorus arundinaceus* Herbaceous Vegetation and 0.1 acres of *Phragmites australis* Herbaceous Vegetation. This will also include 2.1 acres of Improved (Industrial) land.

Adoption of Alternative 2 would also entail the potential for impacts within the remaining 137.4 acres of the project study area due to laydown areas. At maximum, this could potentially affect 46.6 acres of *Sorghum halepense-Schedonorus arundinaceus* Herbaceous Vegetation, 3.4 acres of *Ulmus americana/ Ligustrum sinense* Shrubland, and 5.4 acres of *Phragmites australis* Herbaceous Vegetation. This could also include a maximum of 5.5 acres of impacts to Open Water and 76.5 acres of impacts to Improved (Industrial) land.

4.3.1.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at the CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to impacts to vegetation.

4.3.2 Wildlife

4.3.2.1 Alternative 1 – No Action

Under this alternative, the wastewater treatment facilities would not be constructed. Wastewater from the scrubber system would continue to discharge into on-site PWBs, which would then discharge through the NPDES outfall. No construction or ground disturbance would occur. Therefore, adoption of Alternative 1 would not result in new impacts to terrestrial wildlife.

4.3.2.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Habitats within the project area are heavily disturbed and degraded and are dominated by non-native and invasive species. Habitats potentially removed or impacted include Sorghum halepense-Schedonorus arundinaceus herbaceous vegetation, *Ulmus americana/ Ligustrum sinense* shrubland, *Phragmites australis, and* herbaceous vegetation. Removal of these habitats would permanently displace individuals and populations using the habitats for foraging and breeding. Impacted species could include all generalist species found within the project area. However, the actions are not likely to affect populations of species common to the area, as similar habitat exists in the surrounding landscape. Some of the habitat removed during construction would be used primarily for laydown and staging areas.

Alternative 2 would have beneficial indirect impacts to terrestrial wildlife (i.e., various bird species) resulting from improvements to on-site and off-site water quality due to the reduction of solids, trace metals, and selenium into the Cumberland River. It is largely recognized that the high concentrations of accumulated selenium and other heavy metals within stream and lake sediments can and have posed risks to avian species that rely on fish and other aquatic species as their primary food sources. Once in the aquatic environment, waterborne selenium can enter the food chain and reach levels that are toxic to fish and wildlife (Lemly 2009). In extreme cases where high levels of selenium have been discovered in stream bed sediments, impacts have been rapid and severe, eliminating entire communities of fish and causing reproductive failure in aquatic birds (Lemly 1985b, Ohlendorf 1989). As described by Lemly in the previously mentioned 2009 study, few environmental contaminants have the potential to detrimentally impact aquatic resources on such a broad scale, and even fewer exhibit the complex aquatic cycling pathways and range of toxic effects that are characteristic of selenium. At CUF, current levels of selenium in wastewater effluent actively discharged into downstream waters are considered very low (0.0006 mg/L). However, current data is insufficient to determine the proposed reduction in the concentration of solids, trace metals, and selenium for the proposed CUF WWTF effluent. Likewise, the combined dilution effects, as these source contaminants enter on-site NPDES channels and eventually enter off-site downstream waters, have not yet been determined. As discussed in the surface water section of the EA, this alternative would meet Total Suspended Solids (TSS), Oil and Grease, arsenic, and mercury concentrations to meet the ELG limits for Wet FGD wastewaters at existing Steam-Electric Power Plants, as well as site-specific selenium and nitrate/nitrite limits in the event that EPA grants TVA's request for alternative effluent limits.

No breeding habitat for migratory bird species listed in the IPaC occurs within the project area. Other migratory bird species opportunistically foraging or breeding in the project area may benefit from improvements to water quality. Therefore, adoption of Alternative 2 would result in beneficial impacts to migratory bird species.

No heronries / colonial wading bird colonies occurrences are known from the project area. Therefore, no impacts to heronries / colonial wading bird colonies are anticipated due to adoption of Alternative 2.

The bridge that supports the cliff swallow colony is not expected to experience construction or increases in traffic as a result of Alternative 2. Therefore, no impacts to the cliff swallow colony are anticipated due to adoption of Alternative 2.

No cave habitats are reported from the action area. Therefore, no impacts to cave habitats or cave-obligate species are anticipated as a result of adoption of Alternative 2.

4.3.2.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to impacts to terrestrial wildlife. Therefore, the impacts to wildlife are expected to be the same as under Alternative 2.

4.3.3 Migratory Birds

4.3.3.1 Alternative 1 - No Action

Under the No Action Alternative, the WGFD wastewater treatment system would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. No impacts to migratory birds would occur because on-site conditions would not deviate from their current degraded status and no habitat would be altered.

4.3.3.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and TVA would implement Stages A and B. Although migrating birds may pass through CUF during migration, no suitable breeding habitat occurs within the project area for the blue-winged warbler, Kentucky warbler, prairie warbler, red-headed woodpecker, or wood thrush. Other migratory bird species not listed in the IPaC report could potentially use the action area for breeding and foraging including the song sparrow, American crow, and red-winged blackbird. However, the proposed project is not likely to affect populations of species common to the area, as similar habitat can be found in the surrounding landscape.

4.3.3.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at the CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to impacts to migratory birds.

4.4 Aquatic Ecology

4.4.1 Alternative 1 - No Action

Under the No Action Alternative, the wastewater treatment system would not be developed and constructed at CUF, wastewater from the scrubber system would discharge into on-site PWBs, which would then discharge through the NPDES outfall. Environmental conditions in the project area would not change. However, this alternative would result in not meeting the requirements set forth in the ELGs.

4.4.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and TVA would implement Stages A and B. All conveyances within the Project Study Area are covered under either the site's NPDES or TMSP Permits and are not considered jurisdictional under Sections 401 and 404 of the CWA. Although the Cumberland River does occur adjacent to CUF property, no impacts to aquatic ecology would be anticipated with adoption of Alternative 2. Invertebrates, fish, and mussel fauna of the Cumberland River would not be affected by the project as there would be no direct impact to the river and discharges would take place through the permitted outfall. The wastewater outfall would continue to meet the NPDES requirements.

Improvements to the downstream water quality of the Cumberland River may occur from enhanced wastewater treatment from this alternative. Future beneficial indirect impacts to the aquatic ecology of the Cumberland River may occur as a result of cleaner outfall effluents.

4.4.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to impacts to aquatic ecology. However, Alternative 3 would include the additional treatment of WFGD effluent to meet lower selenium and nitrate/nitrite limits, which theoretically could result in water quality enhancement to downstream waters and the Cumberland River, which could enhance aquatic ecology.

4.5 Threatened and Endangered Species

4.5.1 Alternative 1 - No Action

Under the No Action Alternative, the WGFD wastewater treatment system would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall.

4.5.1.1 Vegetation

Alternative 1 would not result in any impacts to the vegetation within the project study area. On-site conditions would not deviate from their current degraded status, no vegetation

communities would be altered, and no threatened and endangered plants would be disturbed or destroyed within the project study area.

All vegetation communities within the project study area are heavily disturbed and degraded and are dominated by non-native and invasive plant species. Continuous siltation and soil disturbance and the lack of high-quality wetlands on-site precludes the potential for swamp lousewort within the project study area. Likewise, the repeated soil disturbance over several decades and the lack of any forested habitats within the project study area precludes the potential for Price's potato bean within the project study area. As such, this alternative is anticipated to have no effect on any state- or federally-listed plant species.

4.5.1.2 Wildlife

Alternative 1 would not result in any impacts to threatened and endangered wildlife including the bald eagle. On-site conditions would not deviate from their current degraded status, no threatened and endangered wildlife communities would be altered, and no threatened and endangered wildlife would be disturbed or destroyed within the project study area.

4.5.1.3 Migratory Birds

Alternative 1 would not result in any impacts to threatened and endangered migratory birds including the bald eagle. On-site conditions would not deviate from their current degraded status, no threatened and endangered wildlife communities would be altered, and no threatened and endangered migratory birds would be disturbed or destroyed within the project study area.

4.5.1.4 Aquatic Ecology

The federally protected pink mucket was historically documented within the Tennessee River (Kentucky Lake) and is not believed to occur adjacent or immediately downstream from CUF plant. Therefore, no impacts to the pink mucket would occur under the No Action Alternative. The state-listed blue sucker and lake sturgeon are lager fish able to move several miles within the Cumberland River. Because no work would occur within the Cumberland River, no impacts to the blue sucker or lake sturgeon is anticipated to occur regardless of Alternative chosen.

4.5.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and TVA would implement Stages A and B.

4.5.2.1 Vegetation

Adoption of Alternative 2 would involve permanent direct impacts to 4.61 acres in the form of earth-moving operations and construction of the WWTF and potential for impacts as a result of laydown areas within another 137.44 acres on CUF site. However, all vegetation communities within the project study area are heavily disturbed and degraded and are dominated by non-native and invasive plant species. Continuous siltation and soil disturbance and the lack of high-quality wetlands on-site precludes the potential for swamp lousewort within the project study area. Likewise, the repeated soil disturbance over several decades and the lack of any forested habitats within the project study area precludes the

potential for Price's potato bean within the project study area. As such, this alternative is anticipated to have no effect on any state- or federally-listed plant species.

4.5.2.2 Wildlife

The proposed project is not expected to impact threatened and endangered wildlife species, such as the Indiana Bat, gray bat, and northern long-eared bat. No suitable roosting habitat for the Indiana Bat, gray bat, and northern long-eared bat is present within the project study area due to lack of suitable roost trees over three dBH. No caves or cave-like features that could serve as winter hibernacula habitat have been identified on-site. Suitable foraging habitat for the Indiana bat may occur within and adjacent to the area over surface waters and ash impoundments.

4.5.2.3 Migratory Birds

There would be no impacts to the bald eagle as a result of implementing Alternative 2. There is a bald eagle nest within 1,000 feet of the project study area, but no suitable foraging or nesting habitat occurs within the project study area. The Cumberland River adjacent to CUF provides suitable foraging habitat. Since the nest was not definitively identified during the December 2018 site visit, an additional site visit would need to be conducted by June 2019 to determine if the nest is active. If active, no activities would disturb the bald eagle during breeding season. Additionally, USFWS recommend a 660-foot buffer for construction activities visible from any bald eagle nest (USFWS 2007).

4.5.2.4 Aquatic Ecology

The federally protected pink mucket was historically documented within the Tennessee River (Kentucky Lake) and is not believed to occur adjacent or immediately downstream from CUF plant. Therefore, no impacts to the pink mucket would occur. The state-listed blue sucker and lake sturgeon are larger fish able to move several miles within the Cumberland River. Because no work would occur within the Cumberland River, no impacts to the blue sucker or lake sturgeon are anticipated to occur.

4.5.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at the CUF including necessary laydown areas, and other appurtenances would be built. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for this EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to impacts to threatened and endangered species.

4.6 Surface Water and Wastewater

4.6.1 Alternative 1 - No Action

Under the No Action Alternative, TVA would not construct the proposed WWTF; therefore, no construction impacts would occur. TVA would continue to discharge wastewater from the scrubber system at CUF into on-site impoundments and ultimately into newly constructed PWBs (TVA CUF CCR EIS, 2018), which would then discharge through the NPDES outfall. The existing wastewater streams are currently authorized under NPDES Permit TN0005789, and discharges would continue to comply with applicable permit limits until additional limits

are phased in later in the permit term. Therefore, in the interim, surface water quality adjacent to CUF should remain approximately the same. However, the benefits to water quality would not occur and the facility would eventually become non-compliant with the CCR Rule and the ELG regulations as incorporated into the NPDES permit.

4.6.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Alternative 2 primarily deals with WFGD wastewater and discharges from the proposed future treatment at IMP 009. This project will also influence discharges from the future PWB at IMP 001 and discharges from the plant at Outfall 002.

4.6.2.1 Construction Impacts

Wastewaters generated during construction may include construction-related stormwater runoff, drainage of work areas, non-detergent equipment washings and dust control, hydrostatic test discharges and domestic sewage. Construction activities have the potential to temporarily affect surface water via erosion and stormwater runoff.

The proposed WFGD facility and physical/chemical treatment would be located in an area within an industrial site which is partially covered with impervious structures or ground cover. Impervious buildings and infrastructure prevent rain from percolating through the soil and result in additional runoff of water and pollutants into storm drains, ditches, and streams. While most existing structures and infrastructure would be removed from the project site, they would be replaced with the covered wastewater solids dewatering facility, tanks, and sumps as part of the physical/chemical treatment, which would alter the current stormwater flows. Stormwater would be managed on-site to the extent possible and diverted from the treatment systems and directed to previously or newly permitted Tennessee Multi-Sector (TMSP) stormwater outfalls. Therefore, construction on the existing developed area would be expected to increase impervious surface area; however, stormwater discharges would be appropriately designed, managed, and discharged.

Appropriate best management practices (BMPs) would be followed, and proposed project activities including equipment washing and dust control would be conducted in a manner to ensure that waste materials are contained, and the introduction of pollutants to the receiving waters would be minimized. A General Permit for Stormwater Discharges Associated with Construction Activities (TDEC 2016) would be obtained for this project that would require development of a project-specific stormwater pollution prevention plan (SWPPP), which would detail project specific BMPs. These BMPs would be designed to meet design criteria, per the most current version of the TDEC Tennessee Erosion and Sediment Control Handbook (TDEC 2012). Therefore, no adverse impacts to surface water would be expected due to surface water runoff from the construction site.

On-site hydrostatic testing will have the option to use potable or surface waters and would be covered under the current NPDES Permit TN0005789.

Sanitary wastes generated during construction activities would be collected by the existing sewage treatment system, on-site septic system(s) or by means of portable toilets (i.e., porta lets). These portable toilets would be located throughout construction areas and would be

pumped out regularly, and the sewage would be transported by a vacuum truck to a publicly-owned wastewater treatment works that accepts pump out.

With the implementation of appropriate BMPs only short-term, minor, adverse impacts to surrounding surface waters would be expected from construction activities associated with the proposed project.

All conveyances and waterways in the project area are currently included as wastewater treatment facilities and are covered either under the NPDES permit or TMSP permit; therefore, it is not expected that this project would require either an individual or general ARAP permit, or federal 404 permits to be obtained for the proposed project(s).

4.6.2.2 Operational Impacts

The proposed Stage A at CUF includes clarifiers and wastewater treatment solids dewatering equipment (e.g., filter presses or vacuum filters) (See Figure 4-1). The WFGD discharge flows from effluent slurry tanks to either the SynMat® plant for dewatering and marketing of the commercial-grade gypsum or it is sent to a series of lined channels, where it settles and then is mechanically dewatered utilizing heavy machinery. All filtrate, the wastewater stream left over after dewatering at SynMat®, is currently sent to the impoundment system for treatment and fines removed from basins are sent to the on-site dry stacks. Stage A is being installed to allow the fines from the filtrate to be handled dry. However, depending on the timing of various phases of construction the gypsum filtrates would continue to be released to the impoundment system, prior to the completion of the Stage A and would discharge through IMP 001 to the CCW and Outfall 002 to the Cumberland River after settling in the impoundment system.

Once the proposed Stage B which would include physical/chemical treatment of the dewatering effluent was completed, then the Stage A effluent would be directed and treated by Stage B. Stage B would be made up of a series of tanks and/or basins which could include equalization tanks/basins, clarifiers, reaction tanks, chemical feed systems, sludge thickening, and transfer/holding tanks and piping. Stage B would likely use the same solids dewatering as Stage A. This system would utilize chemical addition to help provide metals precipitation and pH control through the introduction of acids/caustics; solids reductions through the introduction of coagulants and flocculents; the precipitation of metals by the introduction of lime and organosulfides; and the use of scale removal agents as needed. All chemicals used in this system would be evaluated by TVA to ensure that they would reduce unwanted interactions, adequately provide treatment, and would not contribute to aquatic toxicity. Required chemicals would be communicated to TDEC to ensure compliance with NPDES requirements. Additionally, chemicals would be stored properly with the appropriate containment to aid in the prevention of unwanted releases.

Proposed WFGD process controls and flow management would be installed as part of the WWTF to facilitate treatment. Raw make-up water that is currently used to send slurry from the effluent tanks to SynMat® is being reduced to improve SynMat® dewatering processes and will have the effect of minimizing the volume of WFGD wastewater to be treated. Additionally, improved upstream scrubber controls (i.e., GE's SulfiTrac sulfite monitoring systems, and oxidation air control) are being installed to aid in the reduction of mercury air re-emissions and to better control selenium speciation to maintain more selenium in the selenite form as opposed to the oxidized selenate form. Selenite is more amendable to physical/chemical treatment than selenate.

This treatment system would be designed to specifically meet TSS, Oil and Grease, arsenic, and mercury concentrations to meet the ELG limits for Wet FGD Wastewaters at existing Steam-Electric Power Plants. Selenium and nitrate-nitrite would be in compliance with final NPDES permit limits following EPA's decision on TVA's request for alternative limits and/or EPA's reconsideration of the 2015 ELGs. As noted above, in 2016, TVA requested the development of site-specific limitations for the monthly average of nitrate/nitrite as N and selenium limits based on fundamentally different factors and is awaiting response from EPA on that request. Please see Table 4-2 below for expected values to be applied at IMP 009 based on the 2015 ELGs. Target limits would be appropriately adjusted should EPA approve TVA's request for alternative limits and/or the final ELGs currently under reconsideration warrant.

Table 4-1. Published 2015 ELG Limits for WFGD Wastewaters

Pollutant	Daily Maximum Limit	Monthly Average Limit
TSS	100 mg/L	30.0 mg/L
Oil and Grease	20.0 mg/L	15.0 mg/L
Arsenic	0.011 mg/L	0.008 mg/L
Mercury	788 ng/L	356 ng/L
Nitrate/Nitrite as N	17 mg/L	4.4 mg/L*
Selenium	0.023 mg/L*	0.012 mg/L*

*TVA is aware that these treatments (both Stages A and B), as designed, would not meet the 2015 ELG requirements, which call for the meeting of specific selenium and nitrate/nitrite limits. TVA is awaiting final responses to its request for alternative effluent limits and regulatory outcomes for the ELGs and will comply with them. The implementation of the proposed WFGD fines dewatering (Stage A) and the physical/chemical wastewater treatment (Stage B) would be a necessary initial phase to meet the September 2021 ELG implementation date for arsenic and mercury limits, as well as CCR Rule requirements. However, upgrading or enhancement of this initial treatment with biological treatment may be required to meet future ELG requirements. Stage A and B are also necessary initial phases to implement Stage C.

The effluent from Stage A and B treatments would flow through IMP 009, where compliance sampling would take place. IMP 009 would discharge into the PWB for additional treatment, where it would be comingled with other site process waters. The PWB would discharge from IMP 001 and ultimately leave the site at Outfall 002.

TVA would conduct an operational characterization of the altered and new wastewater streams to confirm that no significant impacts to the Cumberland River would occur from this action. Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If the operational characterization showed impacts, then mitigation measures, including altered settling times and chemical treatments, would be undertaken to meet requirements ensuring discharges meet NPDES ad chronic toxicity limits and not cause an exceedance of in-stream TDEC Water Quality criteria.

It is anticipated that the discharge water quality would improve with the implementation of these treatment systems, which would have beneficial impacts on the receiving stream by reducing metals and other waste component loadings. Therefore, no direct negative impacts

to the surface waters would be anticipated from the operation of these facilities, because discharge concentrations would be expected to have the same or reduced concentrations of pollutants of concern from current outfall discharges. Additionally, these waste streams would be required to meet NPDES limits at IMP 009, IMP 001, and Whole Effluent Toxicity (WET) testing and Tennessee Water Quality criteria limits at Outfall 002, which are developed to be protective of the receiving stream's designated uses.

4.6.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances will be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The projected area of disturbance used for the EA conservatively assumed that Stage C would be constructed so impacts (temporary and permanent) would be the same for Alternative 3 as they would be for Alternative 2. To meet the selenium and nitrate/nitrite limits enacted by the 2015 ELGs, as noted above in Table 4-2 a biological treatment system could be required. This alternative would propose to construct and operate all three stages of WFGD wastewater treatment (Stages A, B, and C). Biological treatment uses bacteria and/or other small organisms to breakdown wastes and reduce target contaminants.

4.6.3.1 Construction Impacts

Surface water impacts under Alternative 3 would be expected to be similar to that of Alternative 2 with short-term, minor adverse impacts due to construction activities. These impacts, as stated above in Alternative 2, would be mitigated with the implementation of BMPs and good worksite maintenance/housekeeping practices. In order to implement Stage C treatment, Stages A and B treatment would be required as preliminary treatment, and construction could be phased to account for these preliminary needs.

4.6.3.2 Operational Impacts

TVA's WFGD fleet is made up of once through wet scrubbers, as opposed to the industry standard of recirculating scrubbers. Recirculating scrubbers have much lower flows by cycling the waste stream back through the FGD system multiple times. Although this system effectively reduces raw water needs, this process also produces highly concentrated wastewater streams. Since there is a very distinct difference in the age, process and costs to treat the WFGD wastewater at CUF, TVA is seeking to obtain alternative limits based on fundamentally different factors or the addition of a sub-category in the ELG rule being reconsidered which would take into account the process difference between CUF and the WFGD facilities considered by EPA during promulgation of the 2015 ELG rule.

As mentioned above, the treatment system under Stage C would utilize biological organisms to reduce or precipitate selenium and nitrite/nitrate as nitrogen. The discharge flow from the fines dewatering (Stage A) and physical/chemical treatment (Stage B) would be diverted into Stage C for treatment. Stage C was included in the footprint of the limits of disturbance for this EA. This treatment system, which is still in the initial design phase, may require a significant footprint, and significant management of the system and biological organisms under inconsistent site conditions. There will be sludge generated from biological wastewater treatment with requirements to be determined. Additional required chemicals (over the ones used for Stages A and B) would be communicated to TDEC to ensure compliance with NPDES requirements. Additionally, chemicals would be stored properly with the proper containment to aid in the prevention of unwanted releases and all waste products or by-products would be disposed of properly.

The effluent from these treatments would flow through IMP 009, where compliance sampling would take place. The IMP 009 would discharge into the PWB for additional treatment, where it would be comingled with other site process waters. The PWB would discharge from IMP 001 and ultimately leave the site at Outfall 002.

TVA would conduct an operational characterization of the altered and new wastewater streams to confirm that no significant impacts to the Cumberland River would occur from this action. Additionally, no direct negative (toxic) impacts on the Cumberland River are anticipated because Outfall 002 would be required to meet NPDES chronic toxicity limits. If the operational characterization showed impacts, then mitigation measures, including altered settling times and chemical treatments, would be undertaken to meet requirements ensuring discharges meet NPDES and chronic toxicity limits and not cause an exceedance of in-stream TDEC Water Quality criteria.

It is anticipated that as with Alternative 2, the discharge water quality would improve with the implementation of these treatment systems, which would have beneficial impacts on the receiving stream by reducing metals and other waste component loadings. With the implementation of Stage C, it would be expected that even more removal and treatment would take place, thus providing greater beneficial impacts. Therefore, no direct adverse impacts to the surface waters would be anticipated from the operation of these facilities, because discharges concentrations would be expected to have the same or have reduced concentrations of pollutants of concern from current outfall discharges. Additionally, these waste streams would be required to meet NPDES limits at IMP 009, IMP 001, and Whole Effluent Toxicity (WET) testing and Tennessee Water Quality criteria at Outfall 002, which are developed to be protective of the receiving stream's designated uses.

4.7 Groundwater and Geology

4.7.1 Alternative 1 - No Action

Under the No Action Alternative, TVA would not construct and operate the proposed WFGD wastewater treatment facility. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. Project-related environmental conditions in the project area with respect to soils, geology, and groundwater would not change at CUF under the No Action Alternative. Therefore, the No Action Alternative would not be expected to cause any additional direct, indirect, or cumulative effects to local groundwater resources.

4.7.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Adoption of Alternative 2 would slightly affect existing site geology and groundwater. Grading within the project area would occur to a depth of approximately three to four feet below existing grade. Because site soils have been previously disturbed, no significant alterations would occur to any virgin soil or geology. Additionally, the final foundation of the proposed WFGD wastewater treatment system would be composed of a compacted clay sublayer and concrete surface flooring and would remain above the existing groundwater table, therefore preventing any future penetration of leaking substances through the foundation. Additional minor vibrations associated with construction equipment and vehicles as well as other heavy grading machinery would also be generated throughout the course of the project.

4.7.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to geology or groundwater.

4.8 Wetlands

4.8.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into the on-site PWBs, which would then discharge through the NPDES outfall.

Adoption of Alternative 1 would not result in any new or negative impacts to wetlands within the project study area or larger region as there are no wetlands within the proposed project area. On-site conditions would not deviate from their current status and no wetlands would be altered or impacted.

4.8.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B.

Based on current Geographic Information System (GIS) spatial data, adoption of Alternative 2 would involve impacts within the 4.6-acre WWTF footprint in the form of earth-moving operations and construction of the proposed WFGD wastewater treatment system. This includes permanent impacts to 0.1 acre of the on-site Coal Yard Runoff Pond (larger segment).

Adoption of Alternative 2 could also entail the potential for impacts within the remaining 137.4 acres of the project area in the form of laydown areas. This could potentially affect 6.6 acres of stormwater / PWBs (Catch Basin, Metal Cleaning Pond, and Coal Yard Runoff Ponds).

Since all channels and open water areas identified within the project study area are manmade or have been significantly altered to provide drainage and storage of process discharge from CUF site, these features fall under the NPDES permit and are subject to Section 402 of the Clean Water Act. Therefore, they are not classified as jurisdictional wetlands. As such, adoption of Alternative 2 would not result in any direct or indirect impacts to on-site jurisdictional wetlands.

4.8.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the

construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to wetlands. As with Alternative 2, Alternative 3 would not result in any direct or indirect impacts to on-site jurisdictional wetlands.

4.9 Floodplains

As a federal agency, TVA is subject to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is “to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative” (EO 11988, Floodplain Management). The EO is not intended to prohibit floodplain development in all cases, but rather to create a consistent government policy against such development under most circumstances (U.S. Water Resources Council, 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

4.9.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. Therefore, there would be no direct or indirect impacts to floodplains because there would be no physical changes to the current conditions found within the local floodplains.

Figure 4-1. Laydown areas at CUF

4.9.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Under Alternative 2, TVA would construct the WGFD wastewater treatment system outside of the 100-year floodplain and above the 500-year floodplain. However, portions of two proposed laydown areas are proposed within the floodplain and are shown in Figure 4-1. Structural steel and other construction items would be stored in these laydown areas. The laydown areas would be used only during construction and would be returned to their pre-project condition upon completion of the project and would therefore be a temporary use of the floodplain, which would be consistent with EO 11988. To minimize adverse impacts, prior to mobilization, TVA would develop an evacuation plan to relocate flood-damageable, loose, or valuable equipment or material out of the floodplain during a flood.

4.9.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to floodplains.

4.10 Natural Areas, Parks and Recreation

4.10.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. Adoption of the No Action Alternative would not affect natural areas because no project-related work would occur within these areas. Incremental changes to natural areas resulting from natural environmental processes and anthropogenic disturbance may continue, but these changes would not result from the proposed project. Hence, there would be no direct or indirect impacts to natural areas under the No Action Alternative.

4.10.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Adoption of the Alternative 2 would not significantly affect natural areas at the local, regional, or state level. Installing a new WGFD wastewater treatment system in order to remove additional solids, reduce trace metals such as mercury and arsenic, and reduce selenium from the gypsum discharge would not result in any immediate disturbances or alterations to the natural areas within the immediate vicinity of CUF.

4.10.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B, & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to natural areas.

4.11 Cultural and Historic Resources

4.11.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. The No Action alternative would result in no effects on cultural or historic resources as it would involve no ground disturbing activities or structure demolitions and would not add any new visual elements to the viewshed.

4.11.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Because there are no archaeological sites in the APE, Alternative 2 would result in no effects on NRHP-listed or -eligible archaeological sites. There are no known NRHP-eligible above-ground historic architectural properties in the APE, and no listed properties. The addition of the WWFT as a visual element in this landscape would not further diminish the integrity of setting or feeling of any potential historic properties located within the half-mile radius. Therefore, TVA finds that the undertaking would result in no adverse effects on historic properties.

4.11.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B, & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no impacts to archaeological sites or historic properties as no NRHP-listed or -eligible archaeological sites and above-ground historic architectural properties are known to occur in the APE or near CUF.

4.12 Solid Waste and Hazardous Waste

4.12.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site impoundments, which would then discharge through the NPDES outfall. Once the impoundments were no longer receiving CCRs, then CUF would not be able to utilize the new PWBs to handle these fines because such use would not be consistent with the CCR

Rule. The CUF would continue to operate as a small quantity generator of hazardous waste under the current regulations.

4.12.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. The solid waste generated from the proposed WGFD wastewater treatment system would be from construction, operation, and/or maintenance activities associated with the WFGD. Currently, no solid waste management units (SWMUs) or Areas of Concern (AOCs) exist at CUF. Construction waste would likely consist of organic and vegetative materials, waste soil (unsuitable for construction), and some debris associated with clearing, excavation, and grading along with general waste from excess construction materials, equipment maintenance, and office (trailer) activities. All solid waste generated during construction would be managed and disposed in accordance with established TVA programs, in addition to applicable local, state, and federal regulations.

Solid waste generated during operation and maintenance of the WGFD wastewater treatment system would consist of primarily of solids extracted as a result of the new treatment process and garbage generated by operations personnel. Solid waste generated during operation, and maintenance would be managed and disposed in accordance with established TVA programs, in addition to applicable local, state, and federal regulations. In addition, no impacts from the release of solid or hazardous waste are anticipated as a result of Alternative 2.

Construction, operation, and maintenance of the WWTF is not anticipated to change the status of CUF as a small quantity generator of hazardous waste under the current regulations.

4.12.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B, & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, the requirements for Alternative 3 would be similar to Alternative 2 as the footprints and processes are similar. It is not anticipated that the operation of the WGFD wastewater treatment facility would vary significantly in terms of its effects on solid and hazardous wastes as compared to Alternative 2. Alternative 3 would still include Stage A, which would include the equipment necessary for removal of effluent fines for placement in a landfill. Solid waste generated during operation and maintenance would be managed and disposed in accordance with established TVA programs, in addition to applicable local, state, and federal regulations. In addition, no impacts from the release of solid or hazardous waste are anticipated as a result of Alternative 3.

Construction, operation, and maintenance of the WWTF is not anticipated to change the status of CUF as a small quantity generator of hazardous waste under the current regulations.

4.13 Land Use and Prime Farmland

4.13.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. Under the No Action Alternative, no excavations or grading would occur to site soils since the WWTF, laydown areas would not be constructed; therefore, no impacts to Prime Farmland soils would be associated with this alternative.

4.13.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Since the entire CUF Project Study Area for the WWTF is either heavily disturbed and no longer supports agricultural activities, proposed grading and excavation of site soils associated with Alternative 2 should not result in a net decrease or increase in soil fertility value. Additionally, CUF has been producing power since 1973 and because the WWTF project area is on land currently in industrial development and has been for over 50 years, the completion of Form AD 1006 and consultation on Prime Farmlands is not required (Farmland Protection Policy Act, 7 USC 4201). Therefore, no indirect or direct impacts to Prime Farmland are anticipated in association with the proposed project.

4.13.3 Alternative 3 - Construct Wastewater Treatment System Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no substantial difference between Alternatives 2 and 3 with regards to permanent impacts to land use and farmland soils.

4.14 Roadway Transportation

4.14.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into the on-site PWBs, which would then discharge through the NPDES outfall. No changes to existing traffic pattern or volumes would occur with No Action.

4.14.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B.

The daily workforce traffic generated by the construction of the proposed project is expected to peak at 40 workers. Total traffic would vary depending on the timing of the construction of the various components of this alternative; however, the worst-case value of 40 workers per

day is used to establish an upper limit of the construction-related traffic impacts. Conservatively, it is assumed that there is one worker per passenger vehicle resulting in a construction workforce traffic count of 40 (40 inbound trips and 40 outbound trips). The construction workforce traveling to and from the plant site would contribute to the traffic on the local transportation network (such as SR 233 and SR 49). This workforce volume would occur at the beginning and end of the workday. Construction-related vehicles (dozers, backhoes, graders, loaders, etc.) would be delivered to or removed from the work site under both the mobilization and demobilization stages of the project. Overall, the traffic volume generated by the construction workforce and the construction-related vehicles would be minor and temporary. It is assumed that workers would use interstate highways or major arterial roadways as much as possible, but would use lower functioning roadways (SR 233, SR 49) to access CUF. As a stand-alone value, this projected construction workforce traffic would be expected to generate a negligible increase in volume of additional traffic on the plant site or on vicinity roadways and the impacts are expected to be minor. Periodic delivery of wastewater treatment components and other construction materials were also considered in this evaluation and this traffic would not degrade levels of service on area roadways.

The relatively small number of permanent employees operating and maintaining the wastewater facilities (up to 10 new employees) would not degrade existing levels of roadway service on or in the vicinity of CUF.

4.14.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3 there would be no difference between Alternatives 2 and 3 with regards to permanent impacts to traffic and transportation.

4.15 Visual Resources

4.15.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. No effects on visual resources would be anticipated under the No Action Alternative.

4.15.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. No effects on visual resources are anticipated if the proposed treatment facilities are built. Proposed facilities would be consistent with the industrial character of CUF.

4.15.3 Alternative 3 - Construct Wastewater Treatment System Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages

A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no difference between Alternatives 2 and 3 with regards to permanent impacts to visual resources.

4.16 Noise

4.16.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. No new impacts to noise would occur as a result of the No Action Alternative.

4.16.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. Under Alternative 2, construction activities would last approximately 18 months. Most of the work would occur during the day on weekdays. Construction activities would result in a minor increase to traffic on roads near the plant, which would result in minor increases in intermittent noise at some nearby residences. During construction, noise would be generated by a variety of construction equipment, including compactors, front loaders, backhoes, graders, and trucks. Due to the temporary nature of construction, and the site's semi-rural location and distance to the nearest receptors (approximately 0.5 miles), noise from construction is expected to cause negligible short-term impacts. Operation of the WFGD wastewater treatment system would result in the addition of low noise levels. Twisted-shielded-pair (TSP) or triad (TST) instrumentation/signal cable for all 24V DC analog circuits will be used to reduce electrical noise in instrument circuits. Furthermore, a noise-insulated server room will house the WFGD WWTF main control panel, WFGD WWTF network cabinet, WFGD WWFT server cabinet, plant telephone communication equipment, and the control system smart UPS system. Therefore, noise generated from the WFGD WWTF would be inaudible to local residence.

No noise related impacts are anticipated related to operation of the facility.

4.16.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, there would be no difference between Alternatives 2 and 3 with regards to permanent noise related impacts from constructive activities or WFGD WWTF operations.

4.17 Socioeconomics and Environmental Justice

4.17.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into the on-site PWBs,

which would then discharge through the NPDES outfall. Therefore, there would be no effect on local demographics, economic conditions, community services, or EJ populations.

4.17.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B. The demographic characteristics of the project area are not expected to change measurably in response to an increase in the temporary construction workforce needed to prepare the site and construct the facility. The construction workforce is estimated to peak at 30 to 40 workers for all phases of the project. These workers could be drawn from the labor force that currently resides in the study area. Up to 10 additional permanent workers would be employed for long-term operation of the wastewater treatment facility.

Potential economic impacts associated with the proposed project relate to direct and indirect effects of construction as well as the long-term operation of the wastewater treatment facilities.

Construction of the wastewater treatment facility would cause a temporary increase in employment and associated payrolls, the purchases of materials and supplies, and procurement of additional services.

New construction workers and truck drivers are expected to be residents, which would help temporarily reduce unemployment around CUF. Revenue generated from sales tax from any additional purchases would also benefit the local economy. Capital costs associated with the proposed action would have some direct economic benefits to the local area and surrounding community. Some beneficial secondary impacts to the economy are also expected in conjunction with the multiplier effects of construction. For example, local food and service industries would benefit from the demands brought by the increased construction workforce. However, given the size of the anticipated workforce (peak of up to 40 workers) and the temporary nature of the work, overall primary and secondary economic impacts are considered minor.

Community facilities would not be directly affected by the construction and operation of the wastewater facility. No worker relocations to the area are anticipated; therefore, community services including fire, police, medical, and schools would not be affected by the action.

There would be no impacts to EJ communities under Alternative 2. No EJ populations were identified near CUF. No disproportionate effects to minority or low-income populations are anticipated under this alternative.

4.17.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, the socioeconomic impacts associated with construction and operation of the wastewater treatment facility would be the same as identified under Alternative 2.

There would be no impacts to EJ communities under Alternative 3 as no EJ populations were identified near CUF.

4.18 Health and Safety

4.18.1 Alternative 1 - No Action

Under this alternative, the wastewater treatment facilities would not be constructed. CUF would continue to discharge wastewater from the scrubber system into on-site PWBs, which would then discharge through the NPDES outfall. TVA would continue to follow the current operating plan, which includes the ongoing maintenance of CUF and its related structures and parking. No changes to current public health and safety concerns associated with CUF are anticipated under this alternative. There would be no impacts to safety under the No Action Alternative.

4.18.2 Alternative 2 - Construct Wastewater Treatment System, Stages A & B

Under Alternative 2, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. Alternative 2 would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A and B.

Public health and safety concerns related to Alternative 2 would be minor and would consist primarily of potential incidents with construction traffic to and from CUF and laydown areas. Therefore, the impacts to safety are expected to be minor and temporary under Alternative 2.

4.18.3 Alternative 3 - Construct Wastewater Treatment System, Stages A, B & C

Under Alternative 3, a new WFGD wastewater treatment system at CUF including necessary laydown areas, and other appurtenances would be constructed. This alternative would maintain a once through WFGD (scrubber) operation at CUF and would implement Stages A, B, and C. The project footprint, location, and proposed disturbance areas (temporary and permanent) would be the same for Alternative 3 as it would be Alternative 2. While the construction period could be somewhat longer for Alternative 3, public health and safety concerns would be similar to with Alternative 2. However, there is a potential to generate small quantities of hydrogen sulfide gases which can be lethal. On-site and personnel monitors would be utilized to warn workers of hazardous conditions.

4.19 Cumulative Impacts

A cumulative impact analysis considers the potential impact on the environment that may result from the incremental impact of a project when added to other past, present and reasonably foreseeable future actions (40 CFR 1508.7). Baseline conditions reflect the impacts of past and present actions. The impact analyses summarized in preceding sections are based on baseline conditions.

TVA evaluated a range of environmental resource issues for inclusion in the cumulative effects analysis. The proposed action and its connected actions identified under Alternatives 2 and 3 would mostly occur on land that was previously disturbed and is used for industrial purposes. In addition, the surrounding landscape is already subject to environmental stressors associated with continuing industrial operations. As has been described in prior subsections of this EA, the existing quality of environmental resources with the potential to be directly or indirectly affected by project activities is generally low.

4.19.1 Geographic Area of Analysis

The geographic area over which past, present, and future actions could reasonably contribute to cumulative effects is variable and dependent on the resource evaluated. Based upon the defined list of resources potentially affected by cumulative effects, the lands and water resources within a five-mile radius of the proposed actions were considered appropriate for consideration in this analysis. This geographic area also encompasses lands on CUF property proposed for use as laydown during construction.

4.19.2 Identification of "Other Actions"

The only past, present, and reasonably foreseeable future actions that are appropriate for consideration in this cumulative analysis are the proposed bottom ash dewatering facility, new on-site landfill, and access road.

4.19.3 Analysis of Cumulative Effects

To address cumulative impacts, the existing affected environment surrounding the project area was considered in conjunction with the environmental impacts presented in Chapter 4.

As described in the resources analyzed in this EA, the proposed WFGD WWTF project would be located on a previously disturbed industrial site and would not substantially impact land use, geology, floodplains, surface water, groundwater, natural resources, cultural resources, visual resources, natural areas, parks or recreational facilities, and socioeconomic resources.

The project would result in some beneficial impacts during operation due to the increase in vegetated land cover at impoundment areas. In addition, dewatering associated with the dewatering facility, and treated effluent from the new wastewater facility would provide benefits to surface water quality.

There are no other TVA facilities within the five-mile geographic area of analysis. Primary adverse effects of the proposed action as described in the preceding sections of Chapter 4 are related to temporary and localized effects associated with air and noise emissions from construction vehicles, erosion and runoff from construction sites, and minor generation of solid and hazardous wastes. It is likely that the construction phase of the other reasonably foreseeable future actions identified within the region may overlap with the proposed action. However, due to the relatively minor and temporary nature of construction related impacts and the implementation of BMPs to minimize impacts, cumulative effects of the proposed action are considered negligible.

4.20 Unavoidable Adverse Environmental Impacts

Unavoidable adverse effects on air quality and the local sound environment would result from temporary construction of the proposed facilities. Operational effects on air quality and the sound environment would result from employee traffic, materials deliveries and similar activity including incidental operational noise from equipment and machinery. No adverse effects to other resources evaluated in this assessment are anticipated.

4.21 Relationship of Short-Term Uses and Long-Term Productivity

This environmental assessment analyzes the potential environmental effects of constructing and operating a treatment system capable of treating WFGD wastewater along with other process water flows. The new system would remove additional solids, reduce trace metals

such as mercury, arsenic, and selenium and would possibly reduce nitrates/nitrites from the discharged treated wastewater.

Short term use of the environment to achieve the results of wastewater treatment requires use of land and construction materials, use of existing roadways, and correlative, but temporary, increases in emissions from construction, and materials delivery vehicles, as well as increased noise and vibration from construction related activity. Most construction and operational effects can be mitigated through various BMPs including practices which reduce noise and air quality effects.

Construction of the wastewater treatment facility would use land designated for industrial use located within the heart of the Cumberland fossil plant operating areas. The facility location is surrounded by the built areas of the plant and would not be a new location siting. It is unlikely that the constructed facility would ever be dis-mantled though it could be de-commissioned if the fossil plant no longer operated such that treatment of process flows from wet FGD wastewater was no longer needed.

Consequently, effects on land uses may be considered permanent. Short term facility construction effects would be replaced by operations effects from employee and delivery traffic.

There would be a temporary increase in local revenue generation from temporary construction jobs and from new permanent positions required to operate the wastewater plant.

There is the potential that future expansion of the wastewater facility could occur in which case short term effects from construction would occur, but it is unlikely that additional green space or forest land would be needed as there is adequate vacant land within the industrial area for an expanded facility.

No effects to surrounding forested lands are anticipated from the construction and operation of the wastewater plant. The long-term productivity of existing surrounding forests and waterways is expected to continue including unimpeded habitat utilization by resident and migratory species. No increases to species mortality are expected nor will there be losses of wetlands or other Waters of the US as a result of the proposed action.

4.22 Irreversible and Irretrievable Commitments of Resources

A commitment of a resource is considered to be ‘irreversible’ when the primary or secondary effects from its use limit future options for its use. An ‘irretrievable’ commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations.

The construction and operation of the WFGD wastewater treatment facility would require the consumption of diesel and other fuels, structural steel, and other materials as well as chemicals and other materials necessary to water treatment processes. Upon decommissioning some of these materials and substances could be re-cycled and available for re-use.

Resources expended during construction and operation such as fuel, electricity, certain chemicals essential to the treatment processes, and various building materials would not be

retrievable. Land use for the facility would be able to be re-used if the facility were no longer needed.

CHAPTER 5 – LIST OF PREPARERS

5.1 NEPA Project Management

Name:	**Ashley Farless**
Education:	B.S. Civil Engineering
Project Role:	TVA Project Manager, TVA NEPA Coordinator, NEPA Compliance
Experience:	20 years in project management, NEPA Compliance, and environmental planning.

Name:	**Caitlin Fitzpatrick**
Education:	B.S., Environmental Science
Project Role:	TVA NEPA Coordinator, NEPA Compliance
Experience:	8 years in environmental planning and policy and NEPA compliance.

Name:	**Robert Esenwein**
Education:	PhD (ABD) and Board Certified in Environmental Planning
Project Role:	Stantec NEPA Project Manager
Experience:	38 years in water resources, environmental and facilities planning, NEPA and Permitting compliance, and Project Management.

Name:	**Rhett Baggett, PWS, TN-QHP**
Education:	M.S. Earth Science, Hydrology B.S. Biology
Project Role:	Stantec Deputy NEPA Project Manager
Experience:	19 years in project management, ecological studies, permitting NEPA compliance.

5.2 Other Contributors

STANTEC

Name:	**Greg Brubaker, P.E.**
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Project Role:	Solid and Hazardous Waste
Experience:	25 years in solid waste and hazardous materials/waste consulting.

Name:	**Wes Cunningham, PWS, TN-QHP**
Education:	B.S. Biology (Botany)
Project Role:	Wetlands, Vegetation, Threatened and Endangered Species
Experience:	14 years in vegetation inventories and monitoring; wetland delineation, monitoring, and mitigation; and avian, bat, and rare plant surveys.

Name:	**Liz Estes**
Education:	MS, Environmental Management BS, Marine Science
Project Role:	NEPA Technical Editor/QA/QC Manager
Experience:	18 years in environmental regulatory compliance, planning and NEPA.

Name:	**Pam Ferral, Certified Wildlife Biologist, TWS**
Education:	M.S. Wildlife Biology, 1998, B.S. Fisheries and Wildlife Science, 1985
Project Role:	Terrestrial Zoology, Threatened and Endangered Species
Experience:	30 years in threatened and endangered species surveys, conservation planning, rare species habitat management.

Name:	**Dennis J. Mihalek, Jr., P.G.**
Education:	B.S. Geology, 2002
Project Role:	Geology/Hydrology
Experience:	16 years in well installation, groundwater sampling and characterization.

TENNESSEE VALLEY AUTHORITY

Name	**Jack Byars II**
Education:	M.S., Environmental, Safety, and Health Management; B.S., Environmental Science and Technology
Project Role:	Air Quality
Experience:	19 years in air permitting and compliance.

Name:	**Adam Dattilo**
Education:	M.S., Forestry
Project Role:	Vegetation, Threatened and Endangered Plants
Experience:	10 years in botany, restoration ecology, threatened and endangered plant monitoring/surveys, invasive species control, as well as NEPA and ESA compliance.

Name:	**Elizabeth B. Hamrick**
Education:	M.S., Wildlife and B.S. Biology
Project Role:	Terrestrial Ecology (Animals), Terrestrial Threatened and Endangered Species
Experience:	17 years conducting field biology, 12 years technical writing, 8 years compliance with NEPA and ESA.

Name:	**Michaelyn Harle**
Education:	Ph.D. Anthropology
Project Role:	Archaeologist
Experience:	13 years in Archaeology and Cultural Resources Management.

Name:	**Taylor Korth**
Education:	B.S., Civil and Environmental Engineering
Project Role:	Waste Permitting and Groundwater

Experience:	7 years in water resources, civil site design, permitting and compliance, groundwater, and regulatory development.
Name:	**Robert Marker**
Education:	B.S., Outdoor Recreation Resources Management
Project Role:	Parks and Recreation
Experience:	40 years in outdoor recreation resources planning and management.
Name	**Craig Phillips**
Education	M.S. and B.S., Wildlife and Fisheries Science
Project Role:	Aquatic Ecology and Threatened and Endangered Species
Experience:	7 years sampling and hydrologic determination for streams and wet-weather conveyances; 5 years in environmental reviews.
Name:	**Kim Pilarski-Hall**
Education:	M.S., Geography, Minor Ecology
Project Role:	Wetlands, Natural Areas
Experience:	20 years of expertise in wetland assessment, wetland monitoring, watershed assessment, wetland mitigation, restoration as well as NEPA and Clean Water Act compliance.
Name	**A. Chevales Williams**
Education:	B.S., Environmental Engineering
Project Role:	Surface Water
Experience:	12 years in water quality monitoring and compliance; 11 years in NEPA planning and environmental services.
Name:	**Carrie Williamson, P.E., CFM**
Education:	B.S. and M.S., Civil Engineering
Project Role:	Floodplains
Experience:	14 years Floodplains, 3 years River Forecasting, 7 years compliance monitoring.

CHAPTER 6 – ENVIRONMENTAL ASSESSMENT RECIPIENTS

6.1 Federal Agencies

Environmental Protection Agency

U.S. Fish and Wildlife Service

U.S. Army Corps of Engineers

USDA, Natural Resources Conservation Service

6.2 Federally Recognized Tribes

Absentee Shawnee Tribe of Oklahoma

Alabama Quassarte Tribal Town

Cherokee Nation of Oklahoma

Chickasaw Nation

Eastern Band of Cherokee Indians

Eastern Shawnee Tribe of Oklahoma

Kialegee Tribal Town

Muscogee (Creek) Nation of Oklahoma

Shawnee Tribe

Thlopthlocco Tribal Town

United Keetoowah Band of Cherokee Indians in Oklahoma

6.3 State Agencies

Tennessee Department of Agriculture

Tennessee Department of Environment and Conservation

Tennessee Department of Transportation

Tennessee Historical Commission

Tennessee Wildlife Resources Agency

CHAPTER 7 – LITERATURE CITED

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Appendix A

Public Comments and TVA Responses

Document	Comment	Response
Southern Environmental Law Center Letter	However, the draft EA unreasonably considers and prefers an alternative that would result in TVA violating limits on selenium and nitrate/nitrite discharges pursuant to federal regulations and TVA's wastewater discharge permit.	TVA's preferred alternative, Alternative 2, is based on TVA's request for alternative effluent limitations based on fundamentally different factors (see 33 U.S.C. § 1311(n)). Such alternative limits require the approval of the EPA Administrator with the concurrence of the State of Tennessee. TVA's request has not yet been acted upon. Because the request remains active, the inclusion of an alternative reflecting this request is reasonable and appropriate, as is TVA's preference for this alternative. If the request is granted, the selection of Alternative 2 would be in compliance with applicable law. Ultimately, TVA intends to comply with the final limits that are applicable to CUF by established regulatory deadlines. Because TVA recognizes that the limits in the ELGs promulgated in 2015 may be the final limits, TVA has also included an alternative, Alternative 3, that reflects the technology installations necessary to meet those limits. In the event that those limits are the final limits that apply at CUF in the future, TVA will have studied the impacts of the additional Stage C biological treatment components necessary to meet such limits and will be well- positioned to construct those components. Stages A and B are a necessary precursor for Stage C, so TVA's selection of Alternative 2 as the preferred alternative does not impact TVA's ability to later adopt Alternative 3 incorporating the addition of Stage C. In fact, the NPDES permit for CUF reflects a staged approach to future wastewater treatment components, with the limits on mercury and arsenic applying on September 1, 2021 (which are supported by Stages A and B) and the limits on selenium and nitrate/nitrite applying on December 1, 2023 (which are supported by Stage C). If the limits in the 2015 ELG on selenium and nitrate/nitrite go into effect for TVA unchanged on December 1, 2023, TVA will undertake the necessary actions to be in compliance at that time. Please also see response to Comment #4.
Southern Environmental Law Center Letter	Rather than adopting this illegal alternative, TVA must comply with the National Environmental Policy Act and select a reasonable alternative that at the very least complies with existing law.	Alternative 2 is based upon the opportunity provided in 33 USC § 1311(n) to establish alternative effluent limitations based on fundamentally different factors. TVA's request for alternative limits pursuant to this section of the Clean Water Act remains pending. Accordingly, this alternative has legally appropriate underpinnings and is not "illegal" or unreasonable.
Southern Environmental Law Center Letter	The EPA has not extended the final compliance deadline of December 31, 2023. The EPA has not issued a proposed or final rule based on its initial grant of reconsideration of the 2015 ELGs. Therefore, the 2015 ELGs discharge limits remain applicable, and TVA must comply with limits on FGD wastewater discharges by the December 31, 2023 deadline.	Please see response to Comment #1.
Southern Environmental Law Center Letter	In TVA's application for renewal of its National Pollutant Discharge Elimination System (NPDES) permit, TVA relied on its application for a fundamentally different factors variance to seek two alternate applicability dates for FGD wastewater discharge limits. TVA withdrew its initially proposed compliance dates after the EPA postponed the 2015 ELGs. Later, TVA proposed new alternate applicability dates, again depending on the approval or denial of TVA's request for a fundamentally different factors variance. The Tennessee Department of Environment and Conservation rejected this approach when it issued TVA's 2018 NPDES permit. The permit establishes effluent limits for selenium and nitrate/nitrite with an effective date of December 1, 2023. The permit notes that the selenium and nitrate/nitrite discharge limits "may be affected" by an EPA decision on TVA's request for a fundamentally different factors variance and the EPA's overall reconsideration of the ELG rule. However, the permit also makes clear that "until TDEC is notified of these potential changes; the published ELGs are applicable."	Please see response to Comment #1. TVA disagrees that TDEC's issuance of the NPDES permit for CUF in 2018 represented a rejection of TVA's fundamentally different factors request. TVA's request for alternative effluent limits based on fundamentally different factors remains pending. As noted, EPA must approve such a request, with the concurrence of the State of Tennessee. As the commenter noted, the NPDES permit appropriately recognizes that the selenium and nitrate/nitrate discharge limits may be affected by a future decsion on TVA's request. This reflects the fact that EPA had not made a decision on TVA's request at the time the NPDES permit was issued. Since the permit has a reopener clause, TDEC's adaptive approach of incorporating the 2015 ELGs as written could be modified later should EPA ultimately approve TVA's request for alternative limits.

Southern Environmental Law Center Letter	The draft EA's preferred alternative is unreasonable because it would not comply with required limits on selenium and nitrate/nitrite discharges pursuant to the 2015 ELGs and TVA's 2018 NPDES Permit. The preferred Alternative, Construct Wastewater Treatment System, Stages A & B (Alternative 2): TVA would construct a new FGD wastewater treatment facility by completing Stage A (solid removal and dewatering) and Stage B (physical-chemical wastewater treatment to remove dissolved and particulate metals). This alternative would allow TVA to comply with the 2015 ELGs and 2018 NPDES Permit limits on mercury and arsenic by September 1, 2021. It would also lead to TVA violating the 2015 ELGs and TVA's 2018 NPDES Permit limits on selenium and nitrate/nitrite.	Please see response to Comment #1.
Southern Environmental Law Center Letter	Construct Wastewater Treatment System, Stages A, B, and C (Alternative 3): TVA would construct an FGD wastewater treatment facility by completing Stages A, B, and C (biological wastewater treatment). This alternative would allow TVA to comply with all applicable limits from the 2015 ELGs and TVA's 2018 NPDES Permit.	Comment noted.
Southern Environmental Law Center Letter	An agency's discussion of alternatives must be based on reasonable alternatives. An illegal or unauthorized alternative "cannot be considered reasonable" and "need not be contemplated" let alone preferred as a possible alternative. Despite recognizing that Alternative 2 would not comply with the 2015 ELGs and TVA's 2018 NPDES Permit, TVA identifies Alternative 2 as its preferred alternative in the draft EA.	Please see response to Comment #2.
Southern Environmental Law Center Letter	TVA's preferred alternative is unreasonable, and, if adopted, would be contrary to both NEPA and the Clean Water Act. Under NEPA, an agency that considers, let alone prefers, an alternative that violates the law does so at its own peril.	Please see responses to Comment #1 and Comment #2.
Southern Environmental Law Center Letter	TVA must similarly disqualify Alternative 2 as unreasonable. If TVA adopts Alternative 2, it will be planning to violate the terms of its current NPDES permit, which requires it to comply with the numeric effluent limits for selenium and nitrate/nitrite pollution set forth in the 2015 ELGs. Permit violations are violations of the Clean Water Act.	Please see responses to Comment #1, Comment #2, and Comment #4.
Southern Environmental Law Center Letter	Moreover, Alternative 2 would not satisfy the stated purpose of the proposed action, which is "to meet regulatory limits established by EPA's ELGs." Alternative 2 would result in violation of those limits and therefore TVA's selection of Alternative 2 as its preferred alternative would be arbitrary, capricious, and contrary to law.	As provided in 33 U.S.C. § 1311(n), any alternative limits approved by EPA would be "an alternative requirement under subsection (b)(2) of this section"--which is the section that requires EPA to promulgate effluent limitations guidelines. In other words, the concept of alternative limits based on fundamentally different factors is incorporated into ELGs. Thus, TVA's compliance with alternative limits would represent compliance with site-specific limitations under the ELGs. Please see also responses to Comment #1 and Comment #2.
Southern Environmental Law Center Letter	TVA attempts to justify its consideration of and preference for the illegal Alternative B by pointing to a speculative regulatory rollback that may happen at some unknown point in the future. The draft EA states that it is reasonable to prefer Alternative 2 because (1) it is possible that the EPA could grant TVA a variance from the 2015 ELG legal limits on selenium and nitrate/nitrite; and (2) it is possible that the EPA would change the 2015 ELG limits in a way that weakens or eliminates the limits on selenium and nitrate/nitrite. An agency "need only study reasonable alternatives, however, not those which are 'remote, speculative . . . , impractical, or ineffective." It is impossible to predict exactly which changes (if any) the EPA might make to the 2015 ELGs and what variance (if any) the EPA might grant TVA. Thus, the draft EA relies on speculation to state it would comply with a future rollback of or variance from the 2015 ELGs.	Please see response to Comment #1. Alternative 2 is based on TVA's request for alternative effluent limitations based on fundamentally different factors. Because that request remains pending, TVA's inclusion of this as an alternative is not unreasonable. TVA also acknowledges in the text that EPA is undertaking a review of the ELG Rule and the limits for FGD wastewater. While it is admittedly speculative at this time what the result of EPA's review may be, TVA thought it was appropriate to reflect the possibility that Alternative 2 could be appropriate based on either approval of TVA's request for alternative limits or future potential changes to the ELG Rule. In this respect, including Alternative 2 in this EA is efficient because it avoids the need to prepare a subsequent review if TVA's pending request for alternative limits is granted or in the event there are changes to the ELG Rule that would support TVA's implementation of Alternative 2. However, the basis for Alternative 2 is the substance of TVA's request for alternative limits; it is not solely based on potential ELG Rule changes.
Southern Environmental Law Center Letter	Unless and until the obligations of the 2015 ELGs and TVA's 2018 NPDES Permit are lifted or amended, the draft EA's preferred alternative is "per se illegal" and should be disqualified from the analysis as unreasonable.	Please see responses to Comment #1 and Comment #2.

Southern Environmental Law Center Letter	In light of the unreasonableness of TVA's preferred alternative, TVA should revisit the alternatives it considered and rejected to determine whether any of those alternatives would satisfy the purpose and need for the proposed action—which, properly defined, should be to at least comply with its current legal obligations. TVA must also consider alternative techniques for compliance with the 2015 ELGs and TVA's 2018 NPDES Permit, such as switching wholly or in part to low sulfur coal.	Please see response to Comment #1. TVA initially considered a broad range of alternatives to comply with the WFGD ELGs including up to a dry FGD. There is no need to revisit the alternatives that were removed from further consideration by TVA because Alternative 3 would comply with the selenium and nitrate-nitrite limits from the 2015 rule if they are ultimately applicable. This is the second-most fiscally responsible alternative (after receiving approval of alternative limits under Alternative 2 and complying with that) and was also determined to be EPA's best available technology (BAT) in the 2015 ELG rulemaking. The other alternatives therefore do not warrant further consideration due to EPA's determination that physical-chemical treatment plus biological treatment is BAT and for fiscal reasons that support TVA's mission to provide low-cost, reliable power to the people of the Tennessee Valley. Switching wholly or in part to low sulfur coal is not relevant to complying with the arsenic, mercury, selenium and nitrate-nitrite limits. Arsenic, mercury, and selenium are considered trace metals and are independent of the sulfur content of coal. Nitrate-nitrite is not directly related to the coal burned as much as from source water and/or other air pollution control technologies such as selective catalytic converters or selective non-catalytic converters or from other potential wet FGD additives. TVA estimates that if a lower sulfur coal were burned at CUF (e.g., a 3-pound sulfur coal) there would be a reduction in wastewater treatment flows. However, flows would still be much higher than the flows used by EPA to determine biological treatment is BAT in the 2015 rule. CUF flows using a lower sulfur coal are estimated to be either (approximately) 4.2 times or 8.5 times the flow of EPA's biological basis plants (Duke facilities). In addition to this still being a much higher flow than the Duke basis plants, changing to a lower sulfur coal would affect CUF's operating costs and dispatch rates because of the additional restriction of having to purchase lower sulfur coal instead of allowing the fuel flexibility under which CUF currently operates.
TDEC Letter	TDEC believes the Draft EA adequately addresses potential impacts to cultural and natural resources within the proposed project area.	Comment noted.
TDEC Letter	Emissions are anticipated from machinery and equipment. There are no emissions estimates provided or modeling analysis of the possible mobile emissions associated with the heavy equipment and trucks/work crews potentially involved with the project. There are no estimates of fugitive dust emissions likely to be generated during the project. TDEC recommends that TVA consider including estimates or discussion of machinery and fugitive dust emissions in the Final EA.	Fugitive dust emissions from temporary construction equipment are not anticipated to be excessive. All fugitive dust controls required by the Cumberland - Title V permit will be implemented during construction of the WWT facility.
TDEC Letter	CUF is required to maintain a current Title V air permit in order to continue to operate. Fugitive dust control measures are required to be followed by Title V permitted sources. No modifications to the permit would be required if the specified measures to control fugitive dust are followed and potential fugitive dust emissions are of an insignificant nature	Potential fugitive dust emissions will be insignificant, and all control measures required by TDEC will be implemented during construction and operation of the WWT facility.
TDEC Letter	TDEC recommends that any wastes associated with the proposed action or its alternatives be managed in accordance with the Solid and Hazardous Waste Rules and Regulations of the State of Tennessee. TDEC recommends that the Final EA reference that any wastes that are generated during the construction process or uncovered during site preparation are subject to the Solid and Hazardous Waste Rules and Regulations of the State of Tennessee.	The EA will be revised accordingly.
TDEC Letter	TDEC recommends adding the following sentence be added to the end of the first paragraph on hard copy page 33 in Chapter 3 – Section 3.7 "Groundwater and Geology" of the Draft EA. "TVA's landfill for the CUF Dry Ash and Gypsum Disposal Areas have been placed under an Assessment Monitoring Program. The site has continuously exceeded the MCL for Arsenic in three compliance monitoring wells since the fall of 2016. Corrective measures for this facility will be conducted under the ongoing TDEC Commissioner's Order No.	The EA will be revised appropriately in response to this comment.

TDEC Letter	TDEC concurs that a Construction Stormwater Permit with its Stormwater Pollution Prevention Plan will be required since the project will involve the disturbance of more than one acre of land. It is planned to be built in a previously disturbed area. TDEC also anticipates that there will need to be an update to the General National Pollution Discharge Elimination System (NPDES) Storm Water Multi-Sector General Permit for Industrial Activities. The existing NPDES permit # TN0005789 should cover the new plant if modifications are necessary as it has applicability dates based on any EPA revisions for steam electric power plants and a re-opener clause in the permit.	Comment noted. TVA intends to apply for a construction storm water permit as well as modify coverage under the Multi-Sector General Permit for Industrial Activities as required.
TDEC Letter	There is an error in Section 3.6.3.1, that also occurred in the 2017 submittal. The report states that water is used from TVA's intake for showers and eye wash stations, which would make the facility a public water system. Based on previous correspondence between TDEC staff and TVA, this was noted as an error in 2017. TDEC recommends removing eye wash and showers from Section 3.6.3.1 for the Final EA.	The language about eye wash and showers needs to be removed from 3.6.3.1.
Southern Alliance for Clean Energy	In 2015 the U.S. Environmental Protection Agency (EPA) promulgated the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category that limit discharge of toxic chemicals from flue gas desulfurization. TVA must comply with these limitations.	Please see response to Comment #1.
Southern Alliance for Clean Energy	The Draft EA considers and prefers Alternative 2, which would result in TVA violating legal limits on selenium and nitrate/nitrite discharges.	Please see responses to Comment #1 and Comment #2.
Southern Alliance for Clean Energy	TVA bases its preference for Alternative 2 on the possibility that the regulation may be rolled back or that TVA may receive a variance. TVA should not base its decision on speculation but on what the rule states at the time of the decision.	Please see response to Comment #11.
Southern Alliance for Clean Energy	TVA cannot pick and choose where it can speculate on future federal regulatory changes; TVA must remain consistent in relying only on regulations as they currently exist.	Please see responses to Comment #1 and Comment #11.
Southern Alliance for Clean Energy	TVA should reject Alternative 2 and perform an economic analysis of the viability of continuing to operate either or both CUF units after the completion of the comprehensive environmental investigation of the coal combustion residuals stored at the CUF as described in the TVA Cumberland Environmental Investigation Plan. This economic analysis would be similar to the analysis's TVA performed in 2018 comparing the continued investment in CUF to retiring the plant early to avoid additional investments. According to SACE analysis, the two units at CUF cost over $30/MWh in operating and fuel expenses alone in 2015 and 2016. This does not include the capital costs TVA already incurred to install the wet limestone scrubbers and the selective catalytic reduction systems on both CUF units, nor does it include any additional planned capital expenses such as the wastewater treatment facility explored in this Draft EA or the investments needed to keep operating the plant while also complying with the Coal Combustion Residuals (CCR) regulation. According to documents SACE obtained under the TVA IRP process, under TVA's current outlook TVA does not forecast off-peak prices to rise above $30/MWh until 2027 and does not forecast on-peak prices to rise above $30/MWh until 2022. CUF requires additional investment to address wastewater and CCR. With those additional investments rolled into the cost to continue to operate CUF it is likely that the continued operation of CUF will drive TVA's system costs up.	TVA continuously monitors the fleet for the most economical portfolio to provide the least cost to our customers. The economic evaluation for any existing generation resource is based upon an analysis of future costs balanced against future benefits and considers both energy and capacity value, as well as risk and other factors. Market power prices represent market availability for energy only and do not include the cost to secure firm capacity, which is eventually needed across all IRP scenarios to support year-round reliability. Replacing CUF's energy and capacity would drive total TVA system costs higher than maintaining existing CUF capacity, even when factoring in wastewater treatment and CCR costs.
EPA email	Upon review of the document provided to this office, the EPA concludes that appropriate alternatives were considered and analyzed.	Comment noted.

EPA email	Based on the analysis presented in the EA, it has been determined that the proposed action would have no significant direct, indirect, or cumulative impacts on human health and the environment	Comment noted.
EPA email	TVA has acknowledged that the Preferred Alternative 2 would not likely enable TVA to meet the limits on selenium and nitrate/nitrate currently set in the NPDES permit issued for CUF, which incorporates the limits promulgated in the 2015 ELG Rule. As of 2017, the EPA is reconsidering the ELG rule, and TVA's application for alternative limits based on different factors is still pending. Depending on the results of the reconsidered ELG rule and/or EPA's decision on TVA's fundamentally different factors, TVA should reconsider its preferred alternative to enable compliance with the requirements.	Comment noted. Please see response to Comment #1.
EPA email	The EPA requests that this proposed action to construct the wastewater facility adhere to the list of required permits or licenses and best management practices necessary for the implementation of TVA's proposed actions.	Comment noted.
Public Comment Letter	This document is a t least much shorter, for which I am grateful, but we were informed via the Stewart County Standard of its existence April 16 with a deadline of May 3. This is completely inadequate for a county with little internet access and citizens who all too often have to commute substantial distances to work. However, I am grateful for the brevity, conciseness and better organization of this document.	Thank you for your comment. TVA advertises our public comment periods over several different media to reach as large an audience as possible. We make every attempt to get the notices printed as early in the process as possible, but we are sometime limited by the dates that the media publishes.
Public Comment Letter	I favor Alternative C, largely because it deals with selenium. Although this a relatively new environmental issue, it should not be ignored, especially because of its association with gun bluing. Nearly every household in this county around and downstream from Cumberland City has one or more firearms. Therefore, common sense favors Alternative C regardless of how or whether EPA standards are watered down.	The documented water quality in the Cumberland River where the treated wet FGD wastewater discharge ultimately will be routed does not show impaired receiving water quality regarding selenium (i.e., not listed as an impaired water body by TDEC for selenium). Also, the treatment being proposed in Alternative 2 (physical-chemical treatment optimized to the extent practical) will remove some portion of selenium from the discharge.
Public Comment Letter	It would in all likelihood be cheaper and better to implement Alternative C now than in an uncertain future when to do so would probably be more expensive and would surely be more disruptive.	TVA disagrees with the statement that a future installation of treatment to comply with the selenium and nitrate-nitrite ELGs would be more expensive. Past and current experience with wastewater treatment for wet FGD has shown costs generally coming down for man biological treatment installations in the electric utility industry likely due to increased competition and other cost improvements. As TVA is allowing space for the potential future installation of biological treatment in the overall wastewater treatment footprint, TVA also does not expect potential future installation to be particularly disruptive should it be required at CUF.
Public Comment Letter	The email address for you on the TVA website did not work.	Upon receipt of this comment, TVA tested the online comment form and email address and found them to be in working order. We apologize for any technical difficulties that you experienced.